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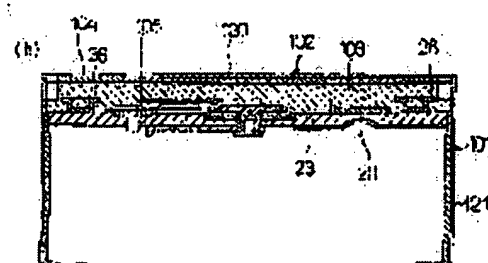
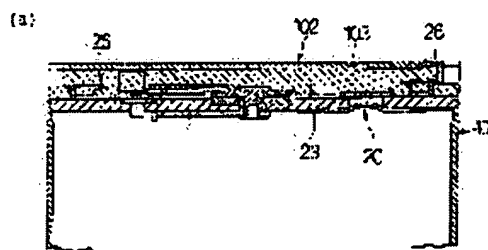
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(54) BATTERY AND BATTERY PACK

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a battery and a battery pack with a secondary battery and a circuit board integrated by resin molding.

SOLUTION: Resin is filled and molded between a battery main body 101 and an electrically connected substrate 102 integrated the both to constitute a battery or a battery pack. Since an engaging member 26 is provided to the battery main body 101, the filled and molded resin molding material 103 can provide an anchoring effect, so that the resin molding material 103 is fixed to the battery main body 101. A heat-sensitive element can be internally mounted on the substrate 102 or in the resin-filled space.



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CLAIMS

[Claim(s)]

[Claim 1] The cell to which a singular cell or two or more unit cells were connected, and the circuit board containing the protection network component and external connection terminal of this cell, It is allotted between the circuit board and said cell, and comes to have the resin mold object which unifies said cell and said circuit board. Said circuit board A protection network component is mounted so that the end face which comes to arrange one electrode terminal of said cell may be faced. And the cell by which it comes to provide an external connection terminal at the rear face of the field which mounted the protection network component, and said resin mold section is characterized by insulating and covering one end face of a cell, and the field in which the protection network component of said circuit board was prepared.

[Claim 2] The cell characterized by coming to have the connection member which connects electrically a cell proper, the substrate with which the terminal for external connection was formed at least, and this substrate and said cell proper, the resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, and an engagement means make this resin mold object engage with a cell proper and/or a substrate.

[Claim 3] The connection member which connects electrically a cell proper, the substrate with which the terminal for external connection was formed at least, and this substrate and said cell proper, The resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, The cell characterized by coming to form sheathing covering which was made to carry out external exposure of the terminal for external connection at least, and covered external surface to the substrate unification cell proper constituted by having an engagement means to make this resin mold object engage with a cell proper and/or a substrate.

[Claim 4] An engagement means is a cell according to claim 2 or 3 by which it comes to prepare a tooth-like object with which an anchor effect is acquired to a resin mold object in the part which a cell proper and/or the resin mold object of a substrate fix.

[Claim 5] An engagement means is a cell according to claim 2 or 3 which is the good resin adhesives of junction nature [as opposed to / the part which a cell proper and/or the resin mold object of a substrate fix is covered, and / a resin mold object and a metal].

[Claim 6] A connection member is a cell according to claim 2 or 3 which is a heat induction component and connects a cell proper to a substrate with the lead.

[Claim 7] Sheathing covering is a cell given in claim 3 which comes to have the winding sheet which covered a part for some of up resin Plastic solids which are made to carry out external exposure of the external connection terminal, and cover some of substrates and resin mold objects [at least], lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a cell proper, up resin Plastic solids and lower resin Plastic solids, and the drum section of a cell proper, and was wound - 6 any 1 terms.

[Claim 8] The cell according to claim 7 by which it comes to form the connection resin Plastic solid which connects an up resin Plastic solid and a lower resin Plastic solid.

[Claim 9] The cell to which a singular cell or two or more unit cells were connected, and the circuit board containing the protection network component and external connection terminal of this cell, The 1st frame which has the window part to which this circuit board and the end side of a cell are held, and said external connection terminal is exposed, The cell pack characterized by having the 2nd frame holding the other end side of said cell, and the connection object of the pair which connects said 1st and 2nd frames, and is arranged along with both ***** of said cell.

[Claim 10] A cell pack [equipped with the sheet which covers the exposure of a cell and constitutes some sheathing objects united with the 1st and 2nd frames] according to claim 9.

[Claim 11] The cell pack according to claim 9 with which a cell and the circuit board are unified, it has the

1st frame fabricated so that it might come to have the resin mold section which insulates the field in which the protection network component of the circuit board was prepared, and is covered and said resin mold section might be surrounded, and said 1st frame and 2nd frame, and the connection object of a pair were really fabricated further.

[Claim 12] The cell pack characterized by having the resin mold object which unifies 1 or two or more cells, the substrate with which the terminal for external connection was formed, and said cell and said substrate, and the resin Plastic solid which is made to expose said terminal for external connection; and covers a part of said resin mold object and said circuit board [at least].

[Claim 13] The cell pack characterize by come to have the connection member which connect electrically 1 or two or more cells , the substrate with which the terminal for external connection be formed at least , and this substrate and said cell , the resin mold object with which the resin by which restoration shaping be carried out fixed to the arbitration side of a cell and each substrate , and unified both , and an engagement means make this resin mold object engage with a cell and/or a substrate .

[Claim 14] 1 or two or more cells, and the substrate with which the terminal for external connection was formed at least, The connection member which connects this substrate and said cell electrically, and the resin mold object with which the resin by which restoration shaping was carried out fixed to the arbitration side of a cell and each substrate, and unified both, The cell pack characterized by coming to form sheathing covering which was made to carry out external exposure of said terminal for external connection at least, and covered external surface to the substrate unification cell constituted by having an engagement means to make this resin mold object engage with a cell and/or a substrate.

[Claim 15] An engagement means is a cell pack according to claim 13 or 14 with which it comes to prepare a toothing-like object with which an anchor effect is acquired to a resin mold object in the part which the resin mold object of a cell and/or a substrate fixes.

[Claim 16] An engagement means is a cell pack according to claim 13 or 14 which is the good resin adhesives of junction nature [as opposed to / the part which the resin mold object of a cell and/or a substrate fixes is covered, and / a resin mold object and a metal].

[Claim 17] A connection member is a cell pack according to claim 13 or 14 which is a heat induction component and connects a cell to a substrate with the lead.

[Claim 18] Sheathing covering is a cell pack given in claims 13 and 14 , and 15 any 1 terms which come to have the winding sheet which covered a part for some of up resin Plastic solids which are make to carry out external exposure of the external connection terminal at least , and cover a substrate and a resin mold object , lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a rechargeable battery , up resin Plastic solids and lower resin Plastic solids , and the drum section of a rechargeable battery , and was wound .

[Claim 19] A cell pack given in claim 12 with which restoration shaping of the resin is carried out while two or more rechargeable batteries adjoin each other mutually, and it comes to unify two or more rechargeable batteries – 18 any 1 terms.

[Claim 20] The cell pack according to claim 18 with which it comes to form the connection resin Plastic solid which connects an up resin Plastic solid and a lower resin Plastic solid.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the cell pack which aimed at formation of a small thin shape, and improvement in robustness so that it might be suitable for cell power sources, such as a cell which raised external connectability and safety, and small pocket electronic equipment.

[0002]

[Description of the Prior Art] The miniaturization of pocket electronic equipment or thin-shape-izing, and progress of further advanced features are remarkable, and high capacity-ization is demanded of the cell or cell pack which serves as the power source in connection with it with small and a thin shape. It is small, and it considers as the cell which enables high capacity-ization, and a lithium system cell is effective, the rechargeable lithium-ion battery of a square shape flat especially is suitable for thin-shape-izing of a device, and application on pocket electronic equipment, such as a portable telephone, is increasing as a rechargeable battery which can perform repeat use.

[0003] Said lithium system cell has high energy density, and since it uses the inflammable organic solvent as the electrolytic solution, it becomes important considering its safety. Also when abnormalities arise according to a certain cause, it is necessary to secure safety so that damage may be done to neither the body nor a device. For example, when between the positive electrode of a cell and a negative electrode connects too hastily according to a certain cause, by the cell with a high energy density, an excessive short-circuit current flows, with internal resistance, the Joule's heat occurs and the temperature rise of the cell is carried out. If a cell becomes an elevated temperature, the reaction of a positive-electrode plate active material and the electrolytic solution, evaporation of the electrolytic solution, decomposition, etc. will arise, the gas pressure inside a cell will go abruptly up, and a cell has a possibility of resulting in a burst or ignition. The case where a rechargeable battery is overcharged, when it puts the pocket electronic equipment loaded with a cell on the side of a heater or the cause that a cell lapses into an elevated-temperature condition leaves it in in the car [which was parked at the flame world], and not only the above-mentioned external short circuit but when, it corresponds.

[0004] By the lithium system cell, while a cell prevents lapsing into an abnormal condition, also when it lapses into an abnormal condition, the function it is made not to be in a dangerous condition is prepared. It is devised so that the active material and the electrolytic solution of a plate may be [a superfluous reaction] hard a lifting as a function of the cell itself, and the polyolefine system fine porosity film used as a separator is equipped with the shutdown function by softening, if it becomes an unusual elevated temperature, and pore being plugged up. Moreover, when a temperature rise is carried out unusually, the relief valve which emits outside the thermal fuse which intercepts an I/O circuit, and abnormality internal pressure is prepared, in the lithium cell of a cylindrical shape, the PTC (Positive Temperature Coefficient) component which connected with the obturation section at the I/O circuit and the serial is arranged, and the protection feature which restricts the excessive current by the external short circuit is prepared.

[0005] As external passive circuit elements, wiring connection of a PTC component or the thermal fuse is made, and the circuit board which constituted the cell protection network which protects a rechargeable battery from overcharge or overdischarge with a rechargeable battery further is prepared, and with a rechargeable battery, these components are held in a pack case and constituted from the small cell and the small cell of a square shape which cannot prepare said thermal fuse or PTC component in a cell by the gestalt of a cell pack.

[0006] However, since a pack case is manufactured by resin shaping, the manufacturing cost of a molding die is high and it is difficult for the costs to join the cost of a pack case, and for there to have been loam Lycium chinense and a development cycle of metal mold for a long time also, and to make a

cost rise correspond to the cell pack of pocket electronic equipment with short injection spacing of a new model like a portable telephone. Moreover, in order [that shaping in resin shaping is possible] to hold reinforcement conversely, it is necessary to increase thickness, and it is thickly limited, and a limit is in the miniaturization of a cell pack, and thin shape-ization.

[0007] Moreover, in order to prevent being used for the danger of being because it being decomposed, the wrong use, or an interest basis, it is important for a cell or a cell pack on security to constitute so that it may be hard to decompose, or to constitute so that it may turn out that it decomposed. Moreover, consideration of being applied to pocket electronic equipment requires the moisture resistance of the strong structure of being able to be equal to the impact and vibration by fall etc., or an electronic-circuitry part. It conceives of such a thing for which strong, and the circuit board which constituted the cell protection network etc. that structure of having moisture resistance should be realized and a cell are unified by resin molding that it is hard to decompose.

[0008] The cell pack by the above-mentioned resin molding has some which were proposed by the applicant for this patent as an application for patent No. 320166 [2000 to], and an application for patent No. 363518 [2000 to], arranges the middle finished product which fixed a rechargeable battery and the circuit board by the connection member in metal mold, as the external connection terminal formed in the circuit board carries out external exposure, it fills up the perimeter of a middle finished product with resin, and it is unifying a rechargeable battery and the circuit board.

[0009] Moreover, in what was indicated by JP,2000-315483,A, what connected a rechargeable battery and the circuit board by the connection member is arranged in metal mold, and the configuration which carries out the resin seal of the circuit board, and is fixed to a rechargeable battery top or a pack case (cell lid), or the configuration which carries out the resin seal of the circuit board and the rechargeable battery is indicated.

[0010]

[Problem(s) to be Solved by the Invention] In order to connect electronic parts mentioned above on the small cell used as power sources, such as pocket electronic equipment, such as a thermal fuse and a PTC component, it is necessary to constitute in the gestalt of the cell pack which held a cell and electronic parts in the case, and leads to a cost rise. Moreover, it is important for heat induction components, such as said thermal fuse, PTC component, etc., to arrange in the condition of carrying out heat association with the cell, and it needs to constitute them in the structure united with the cell. Therefore, a cell of the structure which united the heat induction component with the exterior of a cell is desired, without constituting in the gestalt of a cell pack.

[0011] Moreover, in the case of a rechargeable battery, cell temperature is detected, and it is used for charge control, a safety control, etc. In order to detect said cell temperature, temperature detection sensors, such as a thermistor, are arranged in contact with a rechargeable battery, and a detection output is inputted into a control circuit, and also it is constituted so that it may provide for a battery charger from an external connection terminal. Although it will constitute in the gestalt of a cell pack for arranging a temperature detection sensor, in order to establish the structure for the manufacture man day of a cell pack not only increasing, but arranging so that cell temperature can be detected correctly, there was a trouble by which a cost rise is accompanied.

[0012] Moreover, the small cell is formed in a different field for the positive electrode and the negative electrode from on the structure. If a positive electrode and a negative electrode can be formed in the field which becomes easy for the same flat-surface top or connection, the facilities on use will improve. For example, on the other hand by the cell of a cylindrical shape, the negative electrode is formed in the edge at the positive electrode and the another side edge. Therefore, in the device side which uses this cell, the connection member for connecting with the positive electrode of a cell and a negative electrode will be arranged in the both sides of the hold tooth space of a cell. Moreover, by the cell of a square shape, although a positive electrode and a negative electrode can be prepared in the obturation section, since there are no two poles on the same flat surface and they have a level difference, they have the problem to which external connection structure becomes complicated. The demand which wants to constitute simply the external connection structure over the positive electrode of a cell and a negative electrode with a miniaturization or thin-shape-izing of a device is increasing.

[0013] Moreover, since resin joined to neither a cell nor the circuit board when unifying a cell, the circuit board, etc. by resin mold, unification was not fully made, but a cell and the circuit board needed to be wrapped in resin mold, it became the same gestalt as the cell pack which held a cell and the circuit board in the pack case by which resin shaping was carried out as a result, and the technical problem which can attain neither a miniaturization nor thin shape-ization occurred.

[0014] Although it will be fixed by a cell and the circuit board in the configuration indicated by above-mentioned JP,2000-315483,A since resin mold is made and the mold of the resin is carried out ranging

over the 3rd page of a cell at least after fixing the circuit board to a cell with a double-sided tape. When vibration and an impact are got since resin and a metal are not joined fundamentally as mentioned above, resin mold has much a possibility of separating from a cell. It is making to apply a cell and a cell pack to pocket electronic equipment into the key objective, and vibration and an impact are unescapable and it is necessary to acquire the condition that resin mold engaged with metals, such as a cell.

[0015] Moreover, in the conventional technique same as the above, the connector is prepared at the tip of the lead wire pulled out outside from the circuit board of the inside where the resin mold of the external connection structure of a cell pack was carried out, and the connection with a device is made by the connector by the side of a device, and fitting between males and females. Although it is satisfactory when this external connection structure has allowances in a cell hold tooth space by the comparatively large-sized device, it is difficult for there to be little allowances naturally to a cell hold tooth space, and to apply this connection structure to it by the small device which the cell pack of the invention in this application makes a key objective. When a cell or a cell pack is contained to the cell hold tooth space by the side of a device, the device side contact terminal (probe) prepared there is made to carry out the pressure welding of the connection structure by the side of the cell of the invention in this application, or the device of a cell pack to the external connection terminal which carries out external exposure in the predetermined location of a cell or a cell pack. The resin mold of the circuit board and the cell in which the external connection terminal was formed is carried out, and it constitutes in a cell pack, and in order for the device side connection terminal prepared in the cell hold tooth space by the side of a device and said external connection terminal to change a pressure welding into the condition that contact resistance is small, it is necessary to form the dimension of a cell pack, and the location of an external connection terminal with high precision. In connection by such contact, when formation precision is low, the contact resistance of a device side connection terminal and an external connection terminal becomes large, and will cause abnormalities, such as a poor contact and a voltage drop.

[0016] The target place has this invention in offering the cell and cell pack which unified the cell and the substrate by resin molding.

[0017]

[Means for Solving the Problem] The cell built over the 1st invention of this application in order to attain the above-mentioned purpose. The cell to which a singular cell or two or more unit cells were connected, and the circuit board containing the protection network component and external connection terminal of this cell, It is allotted between the circuit board and said cell, and comes to have the resin mold section which unifies said cell and said circuit board. Said circuit board A protection network component is mounted so that the end face which comes to arrange one electrode terminal of said cell may be faced. And it comes to provide an external connection terminal at the rear face of the field which mounted the protection network component, said resin mold section insulates one end face of a cell, and the field in which the protection network component of said circuit board was prepared, and it is characterized by covering.

[0018] That is, a cell and the circuit board are unified by the resin mold section, and the protection network component mounted in one field of the circuit board is insulated and covered with the resin mold section to the connection lead which connects the forward negative-electrode terminal and these terminals, and the circuit board of a cell. Therefore, the resin mold section serves as connection between a cell and the circuit board, the function to unify, and the function which insulates a protection network component and is covered. Moreover, the external connection terminal is formed in the field of another side of the circuit board, and since an external connection terminal is located outside when it combines with a cell, it functions as charge of a cell, and a discharge terminal. And when the cell which has the above configurations is held in a cell pack, it does not need the connection member which connects the attachment component holding the circuit board or the circuit board, an external connection terminal, and a cell to a sheathing case. For this reason, since compaction of a development cycle and wide use of a sheathing case are enabled and the configuration of a cell pack is also further simplified in order that the design degree of freedom of a sheathing case may improve, cost reduction of a cell pack is realized. Moreover, since the resin mold section fixes and insulates, the arrangement of high density of the insulation with the thermal fuse with which a cell proper is equipped or a PTC component, and the circuit board, and the connection lead which connects each component is attained, and it contributes to an improvement of the volumetric efficiency of a cell greatly.

[0019] Moreover, the substrate with which, as for the cell concerning the 2nd invention of this application, the terminal for external connection was formed at least with the cell proper, The connection member which connects this substrate and said cell proper electrically, and the resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, It is characterized by coming to have an engagement means to make this resin mold object engage with a cell proper and/or a substrate.

[0020] Since, as for the cell which becomes the above-mentioned configuration, a cell proper and a substrate are unified with a resin mold object and the positive electrode of a cell proper and a negative electrode are electrically connected to the external connection terminal on a substrate by the connection member, the external connection terminal of a positive electrode and a negative electrode is formed on the same flat surface. Since a resin mold object fixes to a cell proper and/or a substrate with an engagement means at an engagement condition, the cell by which the cell proper and the substrate were unified firmly is obtained.

[0021] Moreover, the substrate with which, as for the cell concerning the 3rd invention of this application, the terminal for external connection was formed at least with the cell proper, The connection member which connects this substrate and said cell proper electrically, and the resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, It is characterized by coming to form sheathing covering which was made to carry out external exposure of the terminal for external connection at least, and covered external surface to the substrate unification cell proper constituted by having an engagement means to make this resin mold object engage with a cell proper and/or a substrate.

[0022] The cell which becomes the above-mentioned configuration is what unified the cell proper and the substrate with the resin mold object, was made to carry out external exposure of the external connection terminal on a substrate further at least, and gave sheathing covering, and while the unification structure of a cell proper and a substrate is formed more firmly, its appearance can improve and it can raise commodity value.

[0023] In the above-mentioned configuration, an engagement means is formed in the part to which a cell proper and/or the resin mold object of a substrate fix a tooth-like object with which an anchor effect is acquired to a resin mold object, Or it can constitute by making the part which a cell proper and/or the resin mold object of a substrate fix put the good resin adhesives of the junction nature to a resin mold object and a metal, and a resin mold object can be maintained in the condition of having fixed to the cell proper or the substrate.

[0024] Moreover, by connecting a cell proper to a substrate with the lead of a heat induction component, a cell proper and a substrate are connected through heat induction components, such as a thermal fuse and a PTC component, and a connection member can constitute the connection structure equipped with the function to protect a cell at the time of an elevated temperature and an external short circuit.

[0025] Moreover, the up resin Plastic solid which sheathing covering makes carry out external exposure of the external connection terminal at least, and covers a substrate and a resin mold object, The winding sheet which covered a part for some of lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a cell proper, up resin Plastic solids and lower resin Plastic solids, and the drum section of a cell proper, and was wound can be had and constituted. The increment in thickness of the cell by sheathing covering can be suppressed slightly, and improvement in firm integral construction and an appearance can be aimed at. By forming the connection resin Plastic solid which connects said up resin Plastic solid and a lower resin Plastic solid, integral construction can be constituted more firmly.

[0026] Moreover, the cell to which, as for the cell pack concerning the 4th invention of this application, a singular cell or two or more unit cells were connected, The circuit board containing the protection network component and external connection terminal of this cell, and the 1st frame which has the window part to which this circuit board and the end side of a cell are held, and said external connection terminal is exposed, It is characterized by having the 2nd frame holding the other end side of said cell, and the connection object of the pair which connects said 1st and 2nd frames, and is arranged along with both ***** of said cell.

[0027] According to the above-mentioned configuration, the both-ends side of the cell pack which is comparatively easy to receive an external impact operation etc. is considered as the high configuration of mechanical reinforcement, prepares the 2nd frame holding the other end side of the 1st frame holding the circuit board and the end side of a cell, and a cell, respectively, and is ****(ing) it by fitting and wearing with these frames and a cell. For this reason, even when a big impact is impressed by fall etc., it fully functions as a sheathing case in respect of shock resistance etc.

[0028] Moreover, the connection object has secured the necessary protective action corresponding to an impact with an external sheathing case etc. In order to connect the 1st frame and 2nd frame furthermore and to function on the periphery section of a cell as the rigid body by arranging a resin member combining a cell, it is desirable to consider as the configuration stuck to the configuration of the short side face of the cell. however, the aforementioned protective action -- doing so -- the need -- since sufficient thickness and width of face are sufficient, simplification, lightweight-izing, etc. of the configuration as a cell pack can be attained. Thus, the short lateral portion of the cell pack which cannot receive an external impact operation etc. comparatively easily contributes to low-cost-izing of a sheathing case, lightweight-

ization of a cell pack, etc. greatly not to mention the improvement in dependability of a cell pack. In addition, the 1st and 2nd frames and connection objects are fabricated using thermoplastics from a viewpoint of productivity or dimensional accuracy.

[0029] Furthermore, in the cell pack which has the above-mentioned configuration, it is desirable to have the sheet which covers the exposure of a cell and constitutes some sheathing objects united with the 1st and 2nd frames. Although it has prevented that the case which is looping around the side peripheral surface of a cell, and holding and ****(ing) a cell, and serves as the electrode terminal of a cell exposes this sheet and especially that quality of the material is not limited, the film which consists of a material which consists of thermoplastics, and a binder, and the film which gave heat shrink nature to these films are applied. the side face of a cell since such a sheet achieves the function as a sheathing case in a well-known cell pack -- the whole is covered mostly and, if possible, it sticks -- making -- looping around -- at least -- the cut-water section of a sheet -- and it is necessary to wind and to fix the end section Since it loops around so that the side face of the 1st and 2nd frames may furthermore be covered, the reinforcement of a cell pack can be raised further. In addition, although it may wind and the end section may be isolated, as for looping around of a winding sheet, it is desirable to take the form where the cut-water section and the piled-up form, or both touch, and when the thickness of a sheet is thin, it is good also as looping around of two or more layers.

[0030] Moreover, in the cell pack which has the above-mentioned configuration, it is desirable to have the 1st frame fabricated so that a cell and the circuit board might be unified, it might come to have the resin mold section which insulates the field in which the protection network component of the circuit board was prepared, and is covered and said resin mold section might be surrounded. According to this configuration, in addition to doing so the same effectiveness as the case of an above cell independent, the adhesion reinforcement of the part and the 1st frame containing the circuit board improves, and the reinforcement of a cell pack is raised. Furthermore, it is desirable to really fabricate said 1st frame and 2nd frame, and the connection object of a pair, and the process at the time of manufacture is simplified.

[0031] Moreover, the cell pack concerning the 5th invention of this application is characterized by the resin mold section which unifies a singular cell or two or more cells, the substrate with which the terminal for external connection was formed, and said cell and said substrate, and having the resin Plastic solid which is made to expose said terminal for external connection, and covers said resin mold section and said a part of circuit board [at least].

[0032] According to the above-mentioned configuration, it is unified with the resin mold object, and since a cell and a substrate achieve the function of the pack case where resin formation of the resin Plastic solid which covers said substrate and a resin mold object further was carried out, they can obtain the cell pack with which the cell and the substrate were unified. And since only the need part of a substrate and a resin mold object is covered with a resin Plastic solid, the miniaturization of a cell pack, thin-shape-izing, and low cost-ization can be attained. Moreover, since the resin Plastic solid is exposing the terminal for external connection formed in the substrate from the window part and can form said terminal in the arbitration location on a substrate, its design degree of freedom of a cell pack improves.

[0033] Moreover, the substrate with which, as for the cell pack concerning the 6th invention of this application, the terminal for external connection was formed at least with 1 or two or more cells, It is characterized by coming to have the connection member which connects this substrate and said cell electrically, the resin mold object with which the resin by which restoration shaping was carried out fixed to the arbitration side of a cell and each substrate, and unified both, and an engagement means to make this resin mold object engage with a cell and/or a substrate.

[0034] Since, as for the cell pack which becomes the above-mentioned configuration, a cell and a substrate are unified with a resin mold object and the positive electrode of a cell and a negative electrode are electrically connected to the external connection terminal on a substrate by the connection member, the external connection terminal of a positive electrode and a negative electrode is formed on the same flat surface. Since a resin mold object fixes to a cell and/or a substrate with an engagement means at an engagement condition, the cell pack with which the cell and the substrate were unified firmly is obtained. Since a cell protection network, a safety circuit, etc. can be constituted in a substrate, a cell proper can be protected from overcharge, overdischarge, an external short circuit, etc., and accident, such as a burst of the cell accompanying an elevated-temperature condition, can be prevented.

[0035] Moreover, the substrate with which, as for the cell pack concerning the 6th invention of this application, the terminal for external connection was formed at least with 1 or two or more cells, The connection member which connects this substrate and said cell electrically, and the resin mold object with which the resin by which restoration shaping was carried out fixed to the arbitration side of a cell and each substrate, and unified both, It is characterized by coming to form sheathing covering which was made to carry out external exposure of said terminal for external connection at least, and covered external surface

to the substrate unification cell constituted by having an engagement means to make this resin mold object engage with a cell and/or a substrate.

[0036] The cell pack which becomes the above-mentioned configuration is what unified the cell and the substrate with the resin mold object, was made to carry out external exposure of the external connection terminal on a substrate further at least, and gave sheathing covering, and while the unification structure of a cell and a substrate is formed more firmly, its appearance can improve and it can raise commodity value. Since a cell protection network, a safety circuit, etc. can be constituted in a substrate, a cell proper can be protected from overcharge, overdischarge, an external short circuit, etc., accident, such as a burst of the cell proper accompanying an elevated-temperature condition, can be prevented, and the function and robustness of a cell pack which are used mainly as a cell power source of pocket electronic equipment can be raised.

[0037] In the cell pack which becomes the above-mentioned configuration an engagement means A tooth-like object with which an anchor effect is acquired to a resin mold object can be prepared in the part which the resin mold object of a cell and/or a substrate fixes, and can be constituted. Since the condition is known even if strong unification structure is not only acquired, but it is hard to carry out decomposition and is decomposed, since it engages with a resin mold object and the unification with a cell and/or a substrate, and a resin mold object is maintained, the use and accident made the mistake in following on decomposition can be prevented. Moreover, an engagement means is put on the part which the resin mold object of a cell and/or a substrate fixes, and can also be constituted as good resin adhesives of the junction nature to a resin mold object and a metal, and the same effectiveness is acquired.

[0038] Moreover, a connection member is a heat induction component, and by connecting a cell proper to a substrate with the lead of the heat induction component which connects a cell to a substrate with the lead, a cell proper and a substrate are connected through heat induction components, such as a thermal fuse and a PTC component, and it can constitute the connection structure equipped with the function to protect a cell at the time of an elevated temperature and an external short circuit.

[0039] Moreover, the up resin Plastic solid which sheathing covering makes carry out external exposure of the external connection terminal at least, and covers a substrate and a resin mold object, The winding sheet which covered a part for some of lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a rechargeable battery, up resin Plastic solids and lower resin Plastic solids, and the drum section of a rechargeable battery, and was wound can be had and constituted. The increment in thickness of the cell by sheathing covering can be suppressed slightly, and improvement in firm integral construction and an appearance can be aimed at. By forming the connection resin Plastic solid which connects said up resin Plastic solid and a lower resin Plastic solid, integral construction can be constituted more firmly.

[0040] Moreover, when it constitutes a cell pack using two or more cells, unification structure can be firmly constituted in the cell pack using two or more cells by carrying out restoration shaping of the resin, while two or more rechargeable batteries adjoin each other mutually, and constituting so that two or more rechargeable batteries may be unified.

[0041] Moreover, by forming the connection resin Plastic solid which connects an up resin Plastic solid and a lower resin Plastic solid, the resin mold part of each other is connected and the reinforcement of unification structure improves, and also when it applies to the pocket electronic equipment which is easy to get vibration and an impact, it will become suitable.

[0042]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to an accompanying drawing, and an understanding of this invention is presented. In addition, the operation gestalt shown below is an example which materialized this invention, and does not limit the technical range of this invention.

[0043] Drawing 1 shows the appearance of the cells 100a and 100b concerning the 1st operation gestalt, and is constituted as a rechargeable lithium-ion battery of a flat square shape. A cell proper 101 is unified with the terminal assembly (substrate) 102 and the resin mold object 103 which were connected to the positive electrode and negative electrode, and the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 are formed on the external surface of a terminal assembly 102. Cell 100a is the configuration of having arranged the terminal assembly 102 to the obturation side of a cell proper 101, and parallel, and having formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the top face. Cell 100b is the configuration of having arranged the terminal assembly 102 to the side face of a cell proper 101, and parallel, and having formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the side-face edge.

[0044] As said cell proper 101 is shown in drawing 2, a generation-of-electrical-energy element is held in the cell can 22 made from aluminum with which the cross-section configuration was formed in the shape of [of an ellipse] a cylinder like object with base, and it obturates the opening edge by carrying out laser welding of the obturation plate 23. The rivet 25 which insulates by upper gasket 24a and bottom gasket 24b in the center, and serves as a cell negative electrode is concluded by the obturation plate 23 which joins to the cell can 22 and serves as a cell positive electrode. Moreover, some obturation plates 23 are formed in the clad plate which stuck *****, and the relief valve 20 which formed emission opening 20a in the clad plate part is constituted. Moreover, the engagement member 26 of the pair which engages the resin mold object 103 with a cell proper 101 is formed in the both sides of the obturation plate 23. The formation approach of this engagement member 26 can adopt the approach of forming in the obturation plate 23 by press working of sheet metal, or the approach of carrying out weldbonding of the engagement member 26 to the obturation plate 23. In addition, 27 is the sealing plug which closes an electrolytic-solution inlet, after pouring in the electrolytic solution into the cell can 22, an electrolytic-solution inlet is closed by the sealing plug 27, and a sealing plug 27 is welded to the obturation plate 23.

[0045] As shown in the cell proper 101 which becomes the above-mentioned configuration at drawing 3, on the other hand, an electrode plate is joined to a rivet 25, and the PTC component 110 is arranged, and the another side electrode plate of the PTC component 110 is arranged on the insulation sheet 21 stuck on the obturation plate 23, and is joined to the positive-electrode connection lead plate (connection member) 108 mentioned later. On the PTC component 110, the heat insulation sheet 16 is arranged so that the thermal runaway of the PTC component 110 may not be carried out at the time of restoration shaping of the resin mentioned later. Moreover, emission opening 20a of a relief valve 20 is covered, and the resin sheet 40 is stuck.

[0046] Moreover, as a terminal assembly 102 is shown in drawing 4, on the other hand, the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 are formed in a field, it becomes the inside [which becomes an external surface side] side which counters a cell proper 101, and also the positive-electrode connection land 106 and the negative-electrode connection land 107 linked to a cell proper 101 are formed in the direction. Although said positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 can etch and form the copper foil stuck on the plate surface, they can also attach and constitute terminal area material in a plate surface. Since the configuration which formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the side face like cell 100b is suitable structure to carry out sliding contact with the connection terminal by the side of a device, it is desirable to attach tabular terminal area material in a terminal assembly 102. In addition, the key point is connected by the through hole of a terminal assembly 102 which does not illustrate between a field and an another side side on the other hand, and the circuit pattern.

[0047] As shown in drawing 4 (c), the end of the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate (connection member) 109 is joined to said positive-electrode connection land 106 and the negative-electrode connection land 107 by soldering, respectively. As shown in drawing 5, this terminal assembly 102 joins the other end of the positive-electrode connection lead plate 108 to the obturation plate 23, joins the other end of the negative-electrode connection lead plate 109 to the another side electrode plate of said PTC component 110, and is connected to a cell proper 101. In constituting in cell 100a shown in drawing 1 (a), a terminal assembly 102 bends the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate 109 so that it may become parallel to the obturation plate 23, as shown in drawing 5 (a). When it constitutes in cell 100b shown in drawing 1 (b), it is good with the condition of having intersected perpendicularly to the obturation plate 23 as shown in drawing 5 (a).

[0048] After connecting a cell proper 101 and a terminal assembly 102 as mentioned above, as shown in drawing 6, between a cell proper 101 and a terminal assembly 102, restoration shaping of the resin is carried out and a cell proper 101 and a terminal assembly 102 are unified. Although it is hard to join a cell proper 101 to the resin mold object 103 by which the greater part of the front face is a metal body, and restoration shaping was carried out, since the engagement member 26 attached on the obturation plate 23 is wrapped in by the resin mold object 103 and engages with the resin mold object 103 in the undercut part, the anchor effect over the resin mold object 103 is acquired, and the resin mold object 103 will be in the condition of having joined to the cell proper 101. If a rivet-like projection is prepared in order for a terminal assembly 102 to raise engagement nature further, although the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate 109 are wrapped in in the resin mold object 103 and engage with the resin mold object 103, the same effectiveness as the engagement member 26 will be acquired. Thermoplastic polyamide resin is used as resin by which restoration shaping is carried out. This resin is excellent in an adhesive property, electric insulation, and chemical resistance, and since it

can cast in 190 more degrees C – 230 degrees, it can control the thermal effect to a cell proper 101 and PTC component 110 grade.

[0049] Moreover, junction nature with the resin mold object 103, a cell proper 101, and a terminal assembly 102 can also be raised by applying resin and a metal, and adhesive good adhesives to the field which touches a terminal assembly 102 and the resin mold object 103 of a cell proper 101. As these adhesives, the hot melt adhesive of polyamide resin and the adhesives of an epoxy resin system and a silicon conversion resin system are used.

[0050] When the external short circuit of between the positive-electrode external connection terminal 104 and the negative-electrode external connection terminals 105 is carried out by a certain cause, the cells 100a and 100b which become the above-mentioned configuration Since the PTC component 110 which is resistance small in the state of temperature makes resistance usually increase rapidly according to a trip phenomenon when the trip temperature to which the PTC component 110 carried out the temperature rise, and the temperature was set according to the excessive short-circuit current by the short circuit is exceeded It prevents that a short-circuit current is regulated at a stretch, and a cell proper 101 carries out a temperature rise by the external short circuit, and it lapses into the situations, such as a burst. Since the trip of the PTC component 110 is carried out by the temperature rise also when a cell proper 101 is put to hot environments, it prevents that a cell proper 101 will be in a busy condition by hot environments. That is, Cells 100a and 100b become the thing equipped with the safeguard which the PTC component 110 built in.

[0051] Moreover, the internal pressure which the amount of foil-like Itabe fractured the relief valve 20, and carried out the abnormality rise when the pressure of the gas which occurred although there was a possibility that a cell proper 101 might result in a burst if Cells 100a and 100b go up even to abnormal temperature and gas occurs in a cell proper 101 reached the working pressure in the relief valve 20 is emitted outside. Since the emission opening 20a top of a relief valve 20 is closed by the resin sheet 40 and it is further covered with the resin mold object 103, the gas which blew off from emission opening 20a is emitted outside from the interface of the resin sheet 40 and the resin mold object 103, and a cell proper 101. Therefore, it is prevented that a cell proper 101 results in a burst by the temperature rise, and it can be constituted on the cells 100a and 100b by which the safeguard of a duplex was prepared with said PTC component 110.

[0052] The cells 100a and 100b constituted by the above like can aim at improvement in an appearance and reinforcement by preparing sheathing covering further. As shown in drawing 6 (b), sheathing covering can be based on the secondary mold object 120 which forms opening on the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105, covers a terminal assembly 102 top, and covers the side peripheral surface of the resin mold object 103, and the winding sheet 121 wound around the side peripheral surface of a cell proper 101, and the cells 100c and 100d of an appearance as shown in drawing 7 can be made to it. Polypropylene resin, polyethylene terephthalate resin, polycarbonate resin, the resin containing these, etc. are used, and the winding sheet 121 is giving an adhesive layer to this resin, and is stuck on Cells 100a and 100b. Moreover, the effectiveness which raises the function as a cell is done so by using for the aforementioned winding sheet 121 the film which has a desired function. For example, it replaces with the aforementioned resin and the effectiveness of raising the reinforcement of a cell is acquired by using the fiber strengthening mold film which distributed the glass fiber etc. Moreover, an EMI (electromagnetic interference) shielding layer can also be given to the winding sheet 121 by distributing nickel powder and carbonyl iron powder by high concentration in an acrylic pro polymer. In addition to the electromagnetic interference to the electronic parts mounted in a terminal assembly 102, the winding sheet 121 in which this shielding layer was formed does so the effectiveness which controls the electromagnetic interference to the device by which it is equipped with this cell. Moreover, color, a pattern, etc. can also be ornamented at the winding sheet 121. When a cell is especially applied to the device which has the configuration exposed outside, the winding sheet 121 according to the color by the side of a device and a color tone is used.

[0053] Subsequently, the cell pack concerning the 2nd operation gestalt is explained. This operation gestalt shows the example which constituted the cell pack applied to a portable telephone using the rechargeable lithium-ion battery of a flat square shape. It is required that the cell pack applied to a portable telephone should be equipped with the safeguard which protects a rechargeable battery from the mechanical strength which can bear the impact by the fall which is not avoided as the high energy consistency corresponding to advanced features and a pocket device in addition to small, a light weight, and a thin shape, the structure which is hard to be decomposed, a short circuit and overcharge, an elevated temperature, etc., and the cell pack shown below is constituted so that these requirements may be filled.

[0054] The appearance of the cell pack 1 concerning an operation gestalt is shown, and drawing 8 carries

out external exposure of the external connection terminal 6 which becomes an end face from a positive-electrode terminal and a negative-electrode terminal, and a temperature detection terminal on the other hand, it sticks the submersion seal 9 on the test terminal 30 mentioned later, and is constituted by the flat unsymmetrical configuration. Drawing 9 is what disassembled this cell pack 1 and showed each component, and explains the detail and assembly procedure of the main components below.

[0055] The rechargeable battery 2 used for the cell pack 1 is the same configuration as the cell proper 101 (refer to drawing 2) applied to the cell shown in the 1st operation gestalt, and omits the explanation.

[0056] As shown in a rechargeable battery 2 at drawing 10, piece of one side connection 10a of a thermal fuse 10 is welded to a rivet 25. In the top face of a thermal fuse 10, as a broken line shows, the heat insulation sheet 16 was stuck and it has prevented that a thermal fuse 10 melts at the time of the resin restoration mentioned later. Piece of another side connection 10b of a thermal fuse 10 is arranged on the insulation sheet 21 stuck on the obturation plate 23, and is joined to the end of the negative-electrode lead plate 5 mentioned later by spot welding. Moreover, the obturation plate 23 is pasted with thermally conductive adhesives, and a thermal fuse 10 is arranged by the condition of having carried out heat association with the rechargeable battery 2. In addition, although the thermal fuse 10 is applied here, the PTC component 110 is also applicable like the above-mentioned cells 100a and 100b.

[0057] As shown in drawing 11, the positive-electrode soldering land 32 for said external connection terminal 6 and test terminal 30 being formed in a field on the other hand, and becoming a rechargeable battery 2 side, and also the electronic parts 31 including integrated-circuit components being mounted in a direction, and connecting with a rechargeable battery 2 at both sides which the circuit board 3 which constituted the protection network which protects a rechargeable battery 2 from overcharge, overdischarge, and an overcurrent becomes the external surface side, and the negative-electrode soldering land 33 are formed. The end of the positive-electrode lead plate (connection member) 4 is soldered to said positive-electrode soldering land 32, and the end of the negative-electrode lead plate (connection member) 5 is soldered to the negative-electrode soldering land 33. In addition, the display of a circuit pattern, a through hole, etc. which are formed in the circuit board 3 in each drawing is omitted.

[0058] Spot welding of the other end of the negative-electrode lead plate 5 is carried out [the circuit board 3 which finished this connection processing] for the other end of the positive-electrode lead plate 4 to the plate surface of the obturation plate 23 to a rechargeable battery 2, respectively on piece of another side connection 10b of said thermal fuse 10. In this connection condition, since the circuit board 3 has become in the direction which intersects perpendicularly to the plate surface of the obturation plate 23, as shown in drawing 11 (b), each lead plates 4 and 5 of a positive electrode and a negative electrode are bent, a gap is prepared between the plate surface of the circuit board 3, and the plate surface of the obturation plate 23, and it operates orthopedically in the condition of becoming [abbreviation]. Thus, the circuit board 3 is connected to a rechargeable battery 2, and the resin restoration object 7 as shown in drawing 12 (a) is formed.

[0059] Restoration shaping of the resin is carried out, the primary mold object (the 1st frame) 11 is formed in the gap between the rechargeable battery 2 of the above-mentioned resin restoration object 7, and the circuit board 3, and a rechargeable battery 2 and the circuit board 3 are united with it. Formation of the primary mold object 11 holds the resin restoration object 7 in primary mold metal mold, and as shown in drawing 13, it carries out restoration shaping of the resin between a rechargeable battery 2 and the circuit board 3.

[0060] As shown in drawing 14, moving part 41 is constituted by the energization means 45 movable at a fixed part 42 side, and, as for the female mold 36 of primary mold metal mold, the vacuum adsorption section 43 is prepared for moving part 41. If it changes into the condition of having retreated said moving part 41, the resin restoration object 7 is arranged in female mold 36 and moving part 41 is advanced, the base will be forced on the internal surface of a fixed part 42, and a rechargeable battery 2 will be positioned. On the other hand, the circuit board 3 is stuck to the wall surface of the vacuum adsorption section 43 by vacuum suction from the vacuum adsorption section 43, and is positioned.

[0061] Although the variation and the circuit board 3 of the height dimension h of a rechargeable battery 2 are changed owing to not being fixed to a fixed location, the height dimension H from the base of said rechargeable battery 2 to the external connection terminal forming face of the circuit board 3 are fixed to a fixed location by vacuum suction, and since the amount of advance changes according to the height dimension h of a rechargeable battery 2, moving part 41 the circuit board 3 in the rechargeable battery 2 and the circuit board 3 which were positioned in female mold 36, the height dimension H from the base of a rechargeable battery 2 to the external connection terminal forming face of the circuit board 3 will be in a fixed condition by change of the height dimension G of the gap between them.

[0062] The female mold 36 top which positioned a rechargeable battery 2 and the circuit board 3 as mentioned above is closed by the punch, and resin is poured into the gap between a rechargeable battery

2 and the circuit board 3. As shown in drawing 13, the poured-in resin turns also to the perimeter of each lead plates 4 and 5 of the electronic parts 31 mounted in the circuit board 3, a positive electrode, and a negative electrode, it joins to the circuit board 3, and it turns also to the undercut part of the engagement projection 26 formed on the obturation plate 23 of a rechargeable battery 2, and is joined to the obturation plate 23. The thermoplastic polyamide resin which fluidizes at the temperature of extent which does not have a bad influence on electronic parts 31, a rechargeable battery 2, or a thermal fuse 10, and is solidified by temperature fall is suitable for resin. As an example of this resin, the thermoplastic polyamide resin sir melt 817 made from TRL is used. 190–210-degree C molding is possible for the Sir melt 817, and with 5 seconds, since solidification time amount is short, it has the description which can eliminate the thermal effect to a cell and electronic parts.

[0063] If fusing temperature touches the thermal fuse 10 set as 104 degrees C, a thermal fuse 10 is melted and makes the function of cell pack 1 the very thing suspended, since it is the temperature exceeding 200 degrees C even if the temperature of resin is comparatively low. It is suppressing that the cure sticks the heat insulation sheet 16 on a thermal fuse 10, and the heat of resin carries out heat transfer to a thermal fuse 10.

[0064] If the resin with which it filled up is solidified, it can take out from female mold 36 as a middle finished product 8 as shown in drawing 12 (b). It can form in the cell pack 1 by giving sheathing covering to the perimeter of this middle finished product 8. Here, sheathing covering is given by attachment of secondary molding and a winding sheet. An insulator 14 is stuck on the base of a rechargeable battery 2 before carrying out secondary molding.

[0065] As shown in drawing 15, secondary molding arranges said middle finished product 8 to the secondary mold metal mold 46, and fabricates resin to the necessary part of the middle finished product 8. The crevice 50 in which the middle finished product 8 is held is formed in the female mold 47 of the secondary mold metal mold 46, three projections 51 for external connection terminals and projections 52 for test terminals by which advance energization is carried out in the inner direction are prepared in the 1 side-attachment-wall side of a crevice 50, it counters and also the projection 54 for bases by which advance energization is carried out is formed in the inner direction in the side-attachment-wall side. If the middle finished product 8 arranges and said projection 51 for external connection terminals and the projection 52 for test terminals, and the projection 54 for bases make march out in a crevice 50, the pressure welding of the projection 51 for external connection terminals carries out to three external connection terminals 6 formed on the circuit board 3, the pressure welding of the projection 52 for test terminals carries out to a test terminal 30, and it will carry out the pressure welding of the projection 54 for bases to the insulator 14 stuck on the base at the rechargeable battery 2.

[0066] The female mold 47 top of this condition is closed by the punch 48, and it is filled up with resin in the secondary mold metal mold 46 from the gate 53 established in the punch 48. As resin is injected in the secondary mold metal mold 46 from four places and it is shown in drawing 16 External exposure of the external connection terminal 6 and the test terminal 30 of the middle finished product 8 is carried out. While forming the up shaping section 17 which was made to carry out external exposure of the center section of the insulator 14, covered the primary mold object 11 and the circuit board 3, and fixed on the obturation plate 23 of a rechargeable battery 2 The lower shaping section 18 which wrapped in the perimeter of an insulator 14 on the base of a rechargeable battery 2, and fixed in predetermined thickness is formed, and the connection shaping section 19 which connects said up shaping section 17 and the lower shaping section 18 further at the side-face corner of a rechargeable battery is formed.

[0067] In primary molding and secondary molding, the class of resin chosen, respectively may be the same, or may differ. When the class of resin is the same, the degree of adhesion of resin is high and can raise the mechanical strength of a mold part. moreover, the class of resin -- **** -- a case -- each -- the resin according to the property required of a molding process can be chosen. For example, although low-temperature molding will be possible and the resin which was rich in insulation and adhesion with a metal part will be chosen if primary molding makes the key objective the pre-insulation of the circuit board 3 by resin, and the unification with a rechargeable battery 2 and the thermal effect to the circuit board 3 and a thermal fuse 10 is taken into consideration, since secondary molding serves as sheathing of a cell pack, it is rich in a mechanical strength, and the shape of high front planarity is searched for. Since the resin in a melting condition does not touch directly the configuration member (the electronic parts 31 on the circuit board 3, thermal fuse 10) of a thermal effect to which it becomes remarkable, the resin of secondary molding is applicable even if it is resin (for example, resin ingredients, such as ABS plastics) with which elevated-temperature shaping is demanded compared with the resin of primary molding.

[0068] However, when a different resin ingredient is chosen, it is necessary to take into consideration the adhesion of resin, a mechanical strength, the chemical stability of an ingredient, etc. Moreover, as for the color tone of the resin used for secondary molding, it is desirable to make it the color tone of the resin

used by primary molding, comparable, or a dark color. This is for the color tone of primary molding resin penetrating and spoiling the fine sight of a cell pack, when light color resin is used for secondary molding, and it is desirable to make color of secondary molding resin into comparable or a dark color also to the color of the resist applied to the circuit board 3 and it by the same reason.

[0069] As said connection shaping section 19 is shown in drawing 17, resin is fabricated so that the one side 90-degree part of the radii side face of the rechargeable battery 2 of an ellipse may be formed in a right angle for a cross-section configuration. The secondary mold object (the 2nd frame) 12 shown in drawing 12 is formed of said up shaping section 17 and the lower shaping section 18, and the connection shaping section 19.

[0070] As shown in drawing 16, the level difference section 38 is formed in the rechargeable battery approach of the peripheral surface of said up shaping section 17, the side peripheral surface of a rechargeable battery 2 is wound by making this into an attachment positioning line, and the winding sheet 13 is wound. Then, operating state is inspected using the test terminal 30, the submersion seal 9 is stuck in the crevice of test terminal 30 perimeter at an inspection accepted product, and it is formed in the cell pack 1 as shown in drawing 8.

[0071] Thus, since the both-shoulders part of a field is formed in the flat radii corner where it appears in a front face for the radii of the both-sides side of a rechargeable battery 2 on the other hand and the both-shoulders part of an another side side is formed in a square shape corner of the connection shaping section 19, the formed cell pack 1 can prevent reverse loading to a device conjointly with the external connection terminal 6 be formed in an unsymmetrical location. Moreover, a radii corner corresponds to the R configuration of the corner of a device case, and the receipt of it to a device is attained, without forming useless space.

[0072] The configuration of the secondary mold object 12 in the above-mentioned configuration It forms on the circuit board 3 and the primary mold object 11 by making only the up shaping section 17 into secondary molding. Insulator 14a (cast of ABS plastics, ABS+PC resin, and PC resin) fabricated in the same configuration as the lower shaping section 18 is stuck on the base of a rechargeable battery 2, and said connection shaping section 19 is the structure which is not established. The side peripheral surface of a rechargeable battery 2, the up shaping section 17, and the edge of an insulator 14 can be covered, and the winding sheet 13 can also be wound. Since it is not necessary to carry out the mold of the whole, when fabricating the secondary mold object 12 by secondary molding, only a formation field can be put into metal mold and secondary molding can fabricate it. therefore, since it is not necessary to arrange the rechargeable battery 2 whole in metal mold, the thermal effect to a cell is made into the minimum -- the miniaturization of metal mold can both be realized and it is effective also in respect of reduction of a manufacturing cost.

[0073] Moreover, the secondary mold object 12 is beforehand formed in the same appearance configuration as the up shaping section 17 with resin shaping, this can be put on the circuit board 3, primary mold objects 11 can be covered and stuck, and the above-mentioned insulator 14a can be stuck on the base of a rechargeable battery 2, and it can also constitute so that the side peripheral surface of those edges and rechargeable batteries 2 may be covered and the winding sheet 13 may be wound.

[0074] Next, the cell pack concerning the 3rd operation gestalt is explained. This operation gestalt shows the cell pack which used two or more rechargeable batteries.

[0075] Series connection of two rechargeable battery 2a constituted by the flat square shape and the 2b is carried out, it connects with the circuit board 203, and drawing 18 unifies rechargeable battery 2a and 2b of two pieces, and circuit boards 203 with the resin mold object 202, as the appearance of the cell pack 200 concerning the 3rd operation gestalt is shown and it is shown in drawing 19.

[0076] Although rechargeable battery 2a and 2b of fundamental structure are the same as that of the above-mentioned rechargeable battery 2, in order to ensure the unification between rechargeable battery 2a and 2b, the engagement members 26 and 26 are joined also to the base of the cell can 22. The positive-electrode connection land of the circuit board 203 and cell can 22 base of rechargeable battery 2b are connected with the positive-electrode connection lead plate 204, and the negative-electrode connection land of the circuit board 203 and piece of another side connection 10b of said thermal fuse 10 arranged on rechargeable battery 2a are connected with the negative-electrode connection lead plate 205. Moreover, it connects with the series connection lead plate 207 between the obturation plate 23 of rechargeable battery 2a, and the rivet 25 of rechargeable battery 2b.

[0077] As rechargeable battery 2a and 2b of two pieces, and circuit boards 203 by which series connection was carried out, as shown in drawing 19, predetermined spacing is prepared between juxtaposition, it is arranged in metal mold so that it may become the reverse sense mutually, and a primary mold is made. In this process, between rechargeable battery 2a, and the upper and lower sides of 2b and juxtaposition, restoration shaping of the resin is carried out and the resin mold object 202 which unified

rechargeable battery 2a and 2b of two pieces, and circuit boards 203 is formed. The engagement member 26 in which rechargeable battery 2a and 2b are prepared up and down acquires an anchor effect to the resin mold object 202, and makes rechargeable battery 2a and 2b fix the resin mold object 202. Therefore, rechargeable battery 2a, 2b, and the circuit board 203 of a condition unstable only by connecting with each connection lead plate 204,205 and the series connection lead plate 207 of a positive electrode and a negative electrode are unified strongly.

[0078] Although functioned as a cell pack also in the condition which shows in drawing 19, it can form in the cell pack 200 shown in drawing 18 by giving sheathing covering for the improvement in the further reinforcement, and improvement in an appearance. Secondary mold and a winding sheet as well as the cell pack 1 shown with the 2nd operation gestalt can perform sheathing covering. Moreover, on the obturation plate 23 of rechargeable battery 2a, it connects with a rivet 25 like the case where it is shown in drawing 10, a thermal fuse 10 is attached, and the resin sheet 40 is stuck on a relief valve 20.

[0079] The configuration of the cell pack which connected two or more rechargeable batteries to a serial and/or juxtaposition can constitute two rechargeable battery 2a shown in the operation gestalt of the above 3rd, and 2b using the rechargeable battery of the number of arbitration if needed besides the gestalt which carried out series connection. For example, as shown in drawing 20, four rechargeable batteries 2a-2d can be constituted in the cell pack which carried out series connection. If the engagement member 26 is formed in the base of the cells [each second /a / 2 /-2d] obturation plate 23 and the cell can 22 also in this case and restoration shaping of the resin is carried out, two or more rechargeable batteries 2a-2d and circuit boards 203 can be unified firmly.

[0080]

[Effect of the Invention] Since the substrate which formed the external connection terminal at least is united with the cell proper, the cell built over this invention as the above explanation can form the positive electrode and negative electrode of a cell on the same flat surface on a substrate, and becomes possible [constituting the cell connection structure of a device simply]. Moreover, the interior of the heat induction components, such as a thermal fuse, and a PTC component, a thermistor, can be carried out between a cell proper and substrates or to a substrate, and it can constitute on the cell equipped with the cell protection feature, the safeguard, or the charge control function by temperature detection.

[0081] Moreover, the cell pack concerning this invention becomes a suitable thing to apply to the device which it cannot avoid easily that vibration and an impact are added like pocket electronic equipment according to the strong structure by resin mold while it can be constituted in the cell pack which unified a rechargeable battery, the circuit board, etc. and enables small thin shape-ization, without using the pack case by resin shaping. Moreover, since the case by resin shaping is not used, the period and costs for manufacturing resin shaping metal mold are reduced, and it can be made adapted for limited production with a wide variety.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the cell pack which aimed at formation of a small thin shape, and improvement in robustness so that it might be suitable for cell power sources, such as a cell which raised external connectability and safety, and small pocket electronic equipment.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] The miniaturization of pocket electronic equipment or thin-shape-izing, and progress of further advanced features are remarkable, and high capacity-ization is demanded of the cell or cell pack which serves as the power source in connection with it with small and a thin shape. It is small, and it considers as the cell which enables high capacity-ization, and a lithium system cell is effective, the rechargeable lithium-ion battery of a square shape flat especially is suitable for thin-shape-izing of a device, and application on pocket electronic equipment, such as a portable telephone, is increasing as a rechargeable battery which can perform repeat use.

[0003] Said lithium system cell has high energy density, and since it uses the inflammable organic solvent as the electrolytic solution, it becomes important considering its safety. Also when abnormalities arise according to a certain cause, it is necessary to secure safety so that damage may be done to neither the body nor a device. For example, when between the positive electrode of a cell and a negative electrode connects too hastily according to a certain cause, by the cell with a high energy density, an excessive short-circuit current flows, with internal resistance, the Joule's heat occurs and the temperature rise of the cell is carried out. If a cell becomes an elevated temperature, the reaction of a positive-electrode plate active material and the electrolytic solution, evaporation of the electrolytic solution, decomposition, etc. will arise, the gas pressure inside a cell will go abruptly up, and a cell has a possibility of resulting in a burst or ignition. The case where a rechargeable battery is overcharged, when it puts the pocket electronic equipment loaded with a cell on the side of a heater or the cause that a cell lapses into an elevated-temperature condition leaves it in in the car [which was parked at the flame world], and not only the above-mentioned external short circuit but when, it corresponds.

[0004] By the lithium system cell, while a cell prevents lapsing into an abnormal condition, also when it lapses into an abnormal condition, the function it is made not to be in a dangerous condition is prepared. It is devised so that the active material and the electrolytic solution of a plate may be [a superfluous reaction] hard a lifting as a function of the cell itself, and the polyolefine system fine porosity film used as a separator is equipped with the shutdown function by softening, if it becomes an unusual elevated temperature, and pore being plugged up. Moreover, when a temperature rise is carried out unusually, the relief valve which emits outside the thermal fuse which intercepts an I/O circuit, and abnormality internal pressure is prepared, in the lithium cell of a cylindrical shape, the PTC (Positive Temperature Coefficient) component which connected with the obturation section at the I/O circuit and the serial is arranged, and the protection feature which restricts the excessive current by the external short circuit is prepared.

[0005] As external passive circuit elements, wiring connection of a PTC component or the thermal fuse is made, and the circuit board which constituted the cell protection network which protects a rechargeable battery from overcharge or overdischarge with a rechargeable battery further is prepared, and with a rechargeable battery, these components are held in a pack case and constituted from the small cell and the small cell of a square shape which cannot prepare said thermal fuse or PTC component in a cell by the gestalt of a cell pack.

[0006] However, since a pack case is manufactured by resin shaping, the manufacturing cost of a molding die is high and it is difficult for the costs to join the cost of a pack case, and for there to have been loam Lycium chinense and a development cycle of metal mold for a long time also, and to make a cost rise correspond to the cell pack of pocket electronic equipment with short injection spacing of a new model like a portable telephone. Moreover, in order [that shaping in resin shaping is possible] to hold reinforcement conversely, it is necessary to increase thickness, and it is thickly limited, and a limit is in the miniaturization of a cell pack, and thin shape-ization.

[0007] Moreover, in order to prevent being used for the danger of being because it being decomposed, the wrong use, or an interest basis, it is important for a cell or a cell pack on security to constitute so that

it may be hard to decompose, or to constitute so that it may turn out that it decomposed. Moreover, consideration of being applied to pocket electronic equipment requires the moisture resistance of the strong structure of being able to be equal to the impact and vibration by fall etc., or an electronic-circuitry part. It conceives of such a thing for which strong, and the circuit board which constituted the cell protection network etc. that structure of having moisture resistance should be realized and a cell are unified by resin molding that it is hard to decompose.

[0008] The cell pack by the above-mentioned resin molding has some which were proposed by the applicant for this patent as an application for patent No. 320166 [2000 to], and an application for patent No. 363518 [2000 to], arranges the middle finished product which fixed a rechargeable battery and the circuit board by the connection member in metal mold, as the external connection terminal formed in the circuit board carries out external exposure, it fills up the perimeter of a middle finished product with resin, and it is unifying a rechargeable battery and the circuit board.

[0009] Moreover, in what was indicated by JP,2000-315483,A, what connected a rechargeable battery and the circuit board by the connection member is arranged in metal mold, and the configuration which carries out the resin seal of the circuit board, and is fixed to a rechargeable battery top or a pack case (cell lid), or the configuration which carries out the resin seal of the circuit board and the rechargeable battery is indicated.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the substrate which formed the external connection terminal at least is united with the cell proper, the cell built over this invention as the above explanation can form the positive electrode and negative electrode of a cell on the same flat surface on a substrate, and becomes possible [constituting the cell connection structure of a device simply]. Moreover, the interior of the heat induction components, such as a thermal fuse, and a PTC component, a thermistor, can be carried out between a cell proper and substrates or to a substrate, and it can constitute on the cell equipped with the cell protection feature, the safeguard, or the charge control function by temperature detection.

[0081] Moreover, the cell pack concerning this invention becomes a suitable thing to apply to the device which it cannot avoid easily that vibration and an impact are added like pocket electronic equipment according to the strong structure by resin mold while it can be constituted in the cell pack which unified a rechargeable battery, the circuit board, etc. and enables small thin shape-ization, without using the pack case by resin shaping. Moreover, since the case by resin shaping is not used, the period and costs for manufacturing resin shaping metal mold are reduced, and it can be made adapted for limited production with a wide variety.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In order to connect electronic parts mentioned above on the small cell used as power sources, such as pocket electronic equipment, such as a thermal fuse and a PTC component, it is necessary to constitute in the gestalt of the cell pack which held a cell and electronic parts in the case, and leads to a cost rise. Moreover, it is important for heat induction components, such as said thermal fuse, PTC component, etc., to arrange in the condition of carrying out heat association with the cell, and it needs to constitute them in the structure united with the cell. Therefore, a cell of the structure which united the heat induction component with the exterior of a cell is desired, without constituting in the gestalt of a cell pack.

[0011] Moreover, in the case of a rechargeable battery, cell temperature is detected, and it is used for charge control, a safety control, etc. In order to detect said cell temperature, temperature detection sensors, such as a thermistor, are arranged in contact with a rechargeable battery, and a detection output is inputted into a control circuit, and also it is constituted so that it may provide for a battery charger from an external connection terminal. Although it will constitute in the gestalt of a cell pack for arranging a temperature detection sensor, in order to establish the structure for the manufacture man day of a cell pack not only increasing, but arranging so that cell temperature can be detected correctly, there was a trouble by which a cost rise is accompanied.

[0012] Moreover, the small cell is formed in a different field for the positive electrode and the negative electrode from on the structure. If a positive electrode and a negative electrode can be formed in the field which becomes easy for the same flat-surface top or connection, the facilities on use will improve. For example, on the other hand by the cell of a cylindrical shape, the negative electrode is formed in the edge at the positive electrode and the another side edge. Therefore, in the device side which uses this cell, the connection member for connecting with the positive electrode of a cell and a negative electrode will be arranged in the both sides of the hold tooth space of a cell. Moreover, by the cell of a square shape, although a positive electrode and a negative electrode can be prepared in the obturation section, since there are no two poles on the same flat surface and they have a level difference, they have the problem to which external connection structure becomes complicated. The demand which wants to constitute simply the external connection structure over the positive electrode of a cell and a negative electrode with a miniaturization or thin-shape-izing of a device is increasing.

[0013] Moreover, since resin joined to neither a cell nor the circuit board when unifying a cell, the circuit board, etc. by resin mold, unification was not fully made, but a cell and the circuit board needed to be wrapped in resin mold, it became the same gestalt as the cell pack which held a cell and the circuit board in the pack case by which resin shaping was carried out as a result, and the technical problem which can attain neither a miniaturization nor thin shape-ization occurred.

[0014] Although it will be fixed by a cell and the circuit board in the configuration indicated by above-mentioned JP,2000-315483,A since resin mold is made and the mold of the resin is carried out ranging over the 3rd page of a cell at least after fixing the circuit board to a cell with a double-sided tape When vibration and an impact are got since resin and a metal are not joined fundamentally as mentioned above, resin mold has much a possibility of separating from a cell. It is making to apply a cell and a cell pack to pocket electronic equipment into the key objective, and vibration and an impact are unescapable and it is necessary to acquire the condition that resin mold engaged with metals, such as a cell.

[0015] Moreover, in the conventional technique same as the above, the connector is prepared at the tip of the lead wire pulled out outside from the circuit board of the inside where the resin mold of the external connection structure of a cell pack was carried out, and the connection with a device is made by the connector by the side of a device, and fitting between males and females. Although it is satisfactory when this external connection structure has allowances in a cell hold tooth space by the comparatively large-

sized device, it is difficult for there to be little allowances naturally to a cell hold tooth space, and to apply this connection structure to it by the small device which the cell pack of the invention in this application makes a key objective. When a cell or a cell pack is contained to the cell hold tooth space by the side of a device, the device side contact terminal (probe) prepared there is made to carry out the pressure welding of the connection structure by the side of the cell of the invention in this application, or the device of a cell pack to the external connection terminal which carries out external exposure in the predetermined location of a cell or a cell pack. The resin mold of the circuit board and the cell in which the external connection terminal was formed is carried out, and it constitutes in a cell pack, and in order for the device side connection terminal prepared in the cell hold tooth space by the side of a device and said external connection terminal to change a pressure welding into the condition that contact resistance is small, it is necessary to form the dimension of a cell pack, and the location of an external connection terminal with high precision. In connection by such contact, when formation precision is low, the contact resistance of a device side connection terminal and an external connection terminal becomes large, and will cause abnormalities, such as a poor contact and a voltage drop.

[0016] The target place has this invention in offering the cell and cell pack which unified the cell and the substrate by resin molding.

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MEANS

[Means for Solving the Problem] The cell built over the 1st invention of this application in order to attain the above-mentioned purpose The cell to which a singular cell or two or more unit cells were connected, and the circuit board containing the protection network component and external connection terminal of this cell, It is allotted between the circuit board and said cell, and comes to have the resin mold section which unifies said cell and said circuit board. Said circuit board A protection network component is mounted so that the end face which comes to arrange one electrode terminal of said cell may be faced. And it comes to provide an external connection terminal at the rear face of the field which mounted the protection network component, said resin mold section insulates one end face of a cell, and the field in which the protection network component of said circuit board was prepared, and it is characterized by covering. [0018] That is, a cell and the circuit board are unified by the resin mold section, and the protection network component mounted in one field of the circuit board is insulated and covered with the resin mold section to the connection lead which connects the forward negative-electrode terminal and these terminals, and the circuit board of a cell. Therefore, the resin mold section serves as connection between a cell and the circuit board, the function to unify, and the function which insulates a protection network component and is covered. Moreover, the external connection terminal is formed in the field of another side of the circuit board, and since an external connection terminal is located outside when it combines with a cell, it functions as charge of a cell, and a discharge terminal. And when the cell which has the above configurations is held in a cell pack, it does not need the connection member which connects the attachment component holding the circuit board or the circuit board, an external connection terminal, and a cell to a sheathing case. For this reason, since compaction of a development cycle and wide use of a sheathing case are enabled and the configuration of a cell pack is also further simplified in order that the design degree of freedom of a sheathing case may improve, cost reduction of a cell pack is realized. Moreover, since the resin mold section fixes and insulates, the arrangement of high density of the insulation with the thermal fuse with which a cell proper is equipped or a PTC component, and the circuit board, and the connection lead which connects each component is attained, and it contributes to an improvement of the volumetric efficiency of a cell greatly.

[0019] Moreover, the substrate with which, as for the cell concerning the 2nd invention of this application, the terminal for external connection was formed at least with the cell proper, The connection member which connects this substrate and said cell proper electrically, and the resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, It is characterized by coming to have an engagement means to make this resin mold object engage with a cell proper and/or a substrate.

[0020] Since, as for the cell which becomes the above-mentioned configuration, a cell proper and a substrate are unified with a resin mold object and the positive electrode of a cell proper and a negative electrode are electrically connected to the external connection terminal on a substrate by the connection member, the external connection terminal of a positive electrode and a negative electrode is formed on the same flat surface. Since a resin mold object fixes to a cell proper and/or a substrate with an engagement means at an engagement condition, the cell by which the cell proper and the substrate were unified firmly is obtained.

[0021] Moreover, the substrate with which, as for the cell concerning the 3rd invention of this application, the terminal for external connection was formed at least with the cell proper, The connection member which connects this substrate and said cell proper electrically, and the resin mold object which the arbitration side of a cell proper and each substrate was made to fix the resin which carried out restoration shaping, and unified both, It is characterized by coming to form sheathing covering which was made to carry out external exposure of the terminal for external connection at least, and covered external surface to

the substrate unification cell proper constituted by having an engagement means to make this resin mold object engage with a cell proper and/or a substrate.

[0022] The cell which becomes the above-mentioned configuration is what unified the cell proper and the substrate with the resin mold object, was made to carry out external exposure of the external connection terminal on a substrate further at least, and gave sheathing covering, and while the unification structure of a cell proper and a substrate is formed more firmly, its appearance can improve and it can raise commodity value.

[0023] In the above-mentioned configuration, an engagement means is formed in the part to which a cell proper and/or the resin mold object of a substrate fix a tooth-like object with which an anchor effect is acquired to a resin mold object. Or it can constitute by making the part which a cell proper and/or the resin mold object of a substrate fix put the good resin adhesives of the junction nature to a resin mold object and a metal, and a resin mold object can be maintained in the condition of having fixed to the cell proper or the substrate.

[0024] Moreover, by connecting a cell proper to a substrate with the lead of a heat induction component, a cell proper and a substrate are connected through heat induction components, such as a thermal fuse and a PTC component, and a connection member can constitute the connection structure equipped with the function to protect a cell at the time of an elevated temperature and an external short circuit.

[0025] Moreover, the up resin Plastic solid which sheathing covering makes carry out external exposure of the external connection terminal at least, and covers a substrate and a resin mold object, The winding sheet which covered a part for some of lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a cell proper, up resin Plastic solids and lower resin Plastic solids, and the drum section of a cell proper, and was wound can be had and constituted. The increment in thickness of the cell by sheathing covering can be suppressed slightly, and improvement in firm integral construction and an appearance can be aimed at. By forming the connection resin Plastic solid which connects said up resin Plastic solid and a lower resin Plastic solid, integral construction can be constituted more firmly.

[0026] Moreover, the cell to which, as for the cell pack concerning the 4th invention of this application, a singular cell or two or more unit cells were connected, The circuit board containing the protection network component and external connection terminal of this cell, and the 1st frame which has the window part to which this circuit board and the end side of a cell are held, and said external connection terminal is exposed, It is characterized by having the 2nd frame holding the other end side of said cell, and the connection object of the pair which connects said 1st and 2nd frames, and is arranged along with both ***** of said cell.

[0027] According to the above-mentioned configuration, the both-ends side of the cell pack which is comparatively easy to receive an external impact operation etc. is considered as the high configuration of mechanical reinforcement, prepares the 2nd frame holding the other end side of the 1st frame holding the circuit board and the end side of a cell, and a cell, respectively, and is ****(ing) it by fitting and wearing with these frames and a cell. For this reason, even when a big impact is impressed by fall etc., it fully functions as a sheathing case in respect of shock resistance etc.

[0028] Moreover, the connection object has secured the necessary protective action corresponding to an impact with an external sheathing case etc. In order to connect the 1st frame and 2nd frame furthermore and to function on the periphery section of a cell as the rigid body by arranging a resin member combining a cell, it is desirable to consider as the configuration stuck to the configuration of the short side face of the cell. however, the aforementioned protective action -- doing so -- the need -- since sufficient thickness and width of face are sufficient, simplification, lightweight-izing, etc. of the configuration as a cell pack can be attained. Thus, the short lateral portion of the cell pack which cannot receive an external impact operation etc. comparatively easily contributes to low-cost-izing of a sheathing case, lightweight-ization of a cell pack, etc. greatly not to mention the improvement in dependability of a cell pack. In addition, the 1st and 2nd frames and connection objects are fabricated using thermoplastics from a viewpoint of productivity or dimensional accuracy.

[0029] Furthermore, in the cell pack which has the above-mentioned configuration, it is desirable to have the sheet which covers the exposure of a cell and constitutes some sheathing objects united with the 1st and 2nd frames. Although it has prevented that the case which is looping around the side peripheral surface of a cell, and holding and ****(ing) a cell, and serves as the electrode terminal of a cell exposes this sheet and especially that quality of the material is not limited, the film which consists of a material which consists of thermoplastics, and a binder, and the film which gave heat shrink nature to these films are applied. the side face of a cell since such a sheet achieves the function as a sheathing case in a well-known cell pack -- the whole is covered mostly and, if possible, it sticks -- making -- looping around -- at least -- the cut-water section of a sheet -- and it is necessary to wind and to fix the end section Since it loops around so that the side face of the 1st and 2nd frames may furthermore be covered, the

reinforcement of a cell pack can be raised further. In addition, although it may wind and the end section may be isolated, as for looping around of a winding sheet, it is desirable to take the form where the cut-water section and the piled-up form, or both touch, and when the thickness of a sheet is thin, it is good also as looping around of two or more layers.

[0030] Moreover, in the cell pack which has the above-mentioned configuration, it is desirable to have the 1st frame fabricated so that a cell and the circuit board might be unified, it might come to have the resin mold section which insulates the field in which the protection network component of the circuit board was prepared, and is covered and said resin mold section might be surrounded. According to this configuration, in addition to doing so the same effectiveness as the case of an above cell independent, the adhesion reinforcement of the part and the 1st frame containing the circuit board improves, and the reinforcement of a cell pack is raised. Furthermore, it is desirable to really fabricate said 1st frame and 2nd frame, and the connection object of a pair, and the process at the time of manufacture is simplified.

[0031] Moreover, the cell pack concerning the 5th invention of this application is characterized by the resin mold section which unifies a singular cell or two or more cells, the substrate with which the terminal for external connection was formed, and said cell and said substrate, and having the resin Plastic solid which is made to expose said terminal for external connection, and covers said resin mold section and said a part of circuit board [at least].

[0032] According to the above-mentioned configuration, it is unified with the resin mold object, and since a cell and a substrate achieve the function of the pack case where resin formation of the resin Plastic solid which covers said substrate and a resin mold object further was carried out, they can obtain the cell pack with which the cell and the substrate were unified. And since only the need part of a substrate and a resin mold object is covered with a resin Plastic solid, the miniaturization of a cell pack, thin-shape-izing, and low cost-ization can be attained. Moreover, since the resin Plastic solid is exposing the terminal for external connection formed in the substrate from the window part and can form said terminal in the arbitration location on a substrate, its design degree of freedom of a cell pack improves.

[0033] Moreover, the substrate with which, as for the cell pack concerning the 6th invention of this application, the terminal for external connection was formed at least with 1 or two or more cells, It is characterized by coming to have the connection member which connects this substrate and said cell electrically, the resin mold object with which the resin by which restoration shaping was carried out fixed to the arbitration side of a cell and each substrate, and unified both, and an engagement means to make this resin mold object engage with a cell and/or a substrate.

[0034] Since, as for the cell pack which becomes the above-mentioned configuration, a cell and a substrate are unified with a resin mold object and the positive electrode of a cell and a negative electrode are electrically connected to the external connection terminal on a substrate by the connection member, the external connection terminal of a positive electrode and a negative electrode is formed on the same flat surface. Since a resin mold object fixes to a cell and/or a substrate with an engagement means at an engagement condition, the cell pack with which the cell and the substrate were unified firmly is obtained. Since a cell protection network, a safety circuit, etc. can be constituted in a substrate, a cell proper can be protected from overcharge, overdischarge, an external short circuit, etc., and accident, such as a burst of the cell accompanying an elevated-temperature condition, can be prevented.

[0035] Moreover, the substrate with which, as for the cell pack concerning the 6th invention of this application, the terminal for external connection was formed at least with 1 or two or more cells, The connection member which connects this substrate and said cell electrically, and the resin mold object with which the resin by which restoration shaping was carried out fixed to the arbitration side of a cell and each substrate, and unified both, It is characterized by coming to form sheathing covering which was made to carry out external exposure of said terminal for external connection at least, and covered external surface to the substrate unification cell constituted by having an engagement means to make this resin mold object engage with a cell and/or a substrate.

[0036] The cell pack which becomes the above-mentioned configuration is what unified the cell and the substrate with the resin mold object, was made to carry out external exposure of the external connection terminal on a substrate further at least, and gave sheathing covering, and while the unification structure of a cell and a substrate is formed more firmly, its appearance can improve and it can raise commodity value. Since a cell protection network, a safety circuit, etc. can be constituted in a substrate, a cell proper can be protected from overcharge, overdischarge, an external short circuit, etc., accident, such as a burst of the cell proper accompanying an elevated-temperature condition, can be prevented, and the function and robustness of a cell pack which are used mainly as a cell power source of pocket electronic equipment can be raised.

[0037] In the cell pack which becomes the above-mentioned configuration an engagement means A tooth-like object with which an anchor effect is acquired to a resin mold object can be prepared in the

part which the resin mold object of a cell and/or a substrate fixes, and can be constituted. Since the condition is known even if strong unification structure is not only acquired, but it is hard to carry out decomposition and is decomposed, since it engages with a resin mold object and the unification with a cell and/or a substrate, and a resin mold object is maintained, the use and accident made the mistake in following on decomposition can be prevented. Moreover, an engagement means is put on the part which the resin mold object of a cell and/or a substrate fixes, and can also be constituted as good resin adhesives of the junction nature to a resin mold object and a metal, and the same effectiveness is acquired.

[0038] Moreover, a connection member is a heat induction component, and by connecting a cell proper to a substrate with the lead of the heat induction component which connects a cell to a substrate with the lead, a cell proper and a substrate are connected through heat induction components, such as a thermal fuse and a PTC component, and it can constitute the connection structure equipped with the function to protect a cell at the time of an elevated temperature and an external short circuit.

[0039] Moreover, the up resin Plastic solid which sheathing covering makes carry out external exposure of the external connection terminal at least, and covers a substrate and a resin mold object. The winding sheet which covered a part for some of lower resin Plastic solids which cover the opposite side of the substrate arrangement side of a rechargeable battery, up resin Plastic solids and lower resin Plastic solids, and the drum section of a rechargeable battery, and was wound can be had and constituted. The increment in thickness of the cell by sheathing covering can be suppressed slightly, and improvement in firm integral construction and an appearance can be aimed at. By forming the connection resin Plastic solid which connects said up resin Plastic solid and a lower resin Plastic solid, integral construction can be constituted more firmly.

[0040] Moreover, when it constitutes a cell pack using two or more cells, unification structure can be firmly constituted in the cell pack using two or more cells by carrying out restoration shaping of the resin, while two or more rechargeable batteries adjoin each other mutually, and constituting so that two or more rechargeable batteries may be unified.

[0041] Moreover, by forming the connection resin Plastic solid which connects an up resin Plastic solid and a lower resin Plastic solid, the resin mold part of each other is connected and the reinforcement of unification structure improves, and also when it applies to the pocket electronic equipment which is easy to get vibration and an impact, it will become suitable.

[0042]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to an accompanying drawing, and an understanding of this invention is presented. In addition, the operation gestalt shown below is an example which materialized this invention, and does not limit the technical range of this invention.

[0043] Drawing 1 shows the appearance of the cells 100a and 100b concerning the 1st operation gestalt, and is constituted as a rechargeable lithium-ion battery of a flat square shape. A cell proper 101 is unified with the terminal assembly (substrate) 102 and the resin mold object 103 which were connected to the positive electrode and negative electrode, and the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 are formed on the external surface of a terminal assembly 102. Cell 100a is the configuration of having arranged the terminal assembly 102 to the obturation side of a cell proper 101, and parallel, and having formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the top face. Cell 100b is the configuration of having arranged the terminal assembly 102 to the side face of a cell proper 101, and parallel, and having formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the side-face edge.

[0044] As said cell proper 101 is shown in drawing 2, a generation-of-electrical-energy element is held in the cell can 22 made from aluminum with which the cross-section configuration was formed in the shape of [of an ellipse] a cylinder like object with base, and it obturates the opening edge by carrying out laser welding of the obturation plate 23. The rivet 25 which insulates by upper gasket 24a and bottom gasket 24b in the center, and serves as a cell negative electrode is concluded by the obturation plate 23 which joins to the cell can 22 and serves as a cell positive electrode. Moreover, some obturation plates 23 are formed in the clad plate which stuck *****, and the relief valve 20 which formed emission opening 20a in the clad plate part is constituted. Moreover, the engagement member 26 of the pair which engages the resin mold object 103 with a cell proper 101 is formed in the both sides of the obturation plate 23. The formation approach of this engagement member 26 can adopt the approach of forming in the obturation plate 23 by press working of sheet metal, or the approach of carrying out weldbonding of the engagement member 26 to the obturation plate 23. In addition, 27 is the sealing plug which closes an electrolytic-solution inlet, after pouring in the electrolytic solution into the cell can 22, an electrolytic-solution inlet is

closed by the sealing plug 27, and a sealing plug 27 is welded to the obturation plate 23.

[0045] As shown in the cell proper 101 which becomes the above-mentioned configuration at drawing 3, on the other hand, an electrode plate is joined to a rivet 25, and the PTC component 110 is arranged, and the another side electrode plate of the PTC component 110 is arranged on the insulation sheet 21 stuck on the obturation plate 23, and is joined to the positive-electrode connection lead plate (connection member) 108 mentioned later. On the PTC component 110, the heat insulation sheet 16 is arranged so that the thermal runaway of the PTC component 110 may not be carried out at the time of restoration shaping of the resin mentioned later. Moreover, emission opening 20a of a relief valve 20 is covered, and the resin sheet 40 is stuck.

[0046] Moreover, as a terminal assembly 102 is shown in drawing 4, on the other hand, the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 are formed in a field, it becomes the inside [which becomes an external surface side] side which counters a cell proper 101, and also the positive-electrode connection land 106 and the negative-electrode connection land 107 linked to a cell proper 101 are formed in the direction. Although said positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 can etch and form the copper foil stuck on the plate surface, they can also attach and constitute terminal area material in a plate surface. Since the configuration which formed the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105 in the side face like cell 100b is suitable structure to carry out sliding contact with the connection terminal by the side of a device, it is desirable to attach tabular terminal area material in a terminal assembly 102. In addition, the key point is connected by the through hole of a terminal assembly 102 which does not illustrate between a field and an another side side on the other hand, and the circuit pattern.

[0047] As shown in drawing 4 (c), the end of the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate (connection member) 109 is joined to said positive-electrode connection land 106 and the negative-electrode connection land 107 by soldering, respectively. As shown in drawing 5, this terminal assembly 102 joins the other end of the positive-electrode connection lead plate 108 to the obturation plate 23, joins the other end of the negative-electrode connection lead plate 109 to the another side electrode plate of said PTC component 110, and is connected to a cell proper 101. In constituting in cell 100a shown in drawing 1 (a), a terminal assembly 102 bends the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate 109 so that it may become parallel to the obturation plate 23, as shown in drawing 5 (a). When it constitutes in cell 100b shown in drawing 1 (b), it is good with the condition of having intersected perpendicularly to the obturation plate 23 as shown in drawing 5 (a).

[0048] After connecting a cell proper 101 and a terminal assembly 102 as mentioned above, as shown in drawing 6, between a cell proper 101 and a terminal assembly 102, restoration shaping of the resin is carried out and a cell proper 101 and a terminal assembly 102 are unified. Although it is hard to join a cell proper 101 to the resin mold object 103 by which the greater part of the front face is a metal body, and restoration shaping was carried out, since the engagement member 26 attached on the obturation plate 23 is wrapped in by the resin mold object 103 and engages with the resin mold object 103 in the undercut part, the anchor effect over the resin mold object 103 is acquired, and the resin mold object 103 will be in the condition of having joined to the cell proper 101. If a rivet-like projection is prepared in order for a terminal assembly 102 to raise engagement nature further, although the positive-electrode connection lead plate 108 and the negative-electrode connection lead plate 109 are wrapped in in the resin mold object 103 and engage with the resin mold object 103, the same effectiveness as the engagement member 26 will be acquired. Thermoplastic polyamide resin is used as resin by which restoration shaping is carried out. This resin is excellent in an adhesive property, electric insulation, and chemical resistance, and since it can cast in 190 more degrees C - 230 degrees, it can control the thermal effect to a cell proper 101 and PTC component 110 grade.

[0049] Moreover, junction nature with the resin mold object 103, a cell proper 101, and a terminal assembly 102 can also be raised by applying resin and a metal, and adhesive good adhesives to the field which touches a terminal assembly 102 and the resin mold object 103 of a cell proper 101. As these adhesives, the hot melt adhesive of polyamide resin and the adhesives of an epoxy resin system and a silicon conversion resin system are used.

[0050] When the external short circuit of between the positive-electrode external connection terminal 104 and the negative-electrode external connection terminals 105 is carried out by a certain cause, the cells 100a and 100b which become the above-mentioned configuration Since the PTC component 110 which is resistance small in the state of temperature makes resistance usually increase rapidly according to a trip phenomenon when the trip temperature to which the PTC component 110 carried out the temperature rise, and the temperature was set according to the excessive short-circuit current by the short circuit is

exceeded It prevents that a short-circuit current is regulated at a stretch, and a cell proper 101 carries out a temperature rise by the external short circuit, and it lapses into the situations, such as a burst. Since the trip of the PTC component 110 is carried out by the temperature rise also when a cell proper 101 is put to hot environments, it prevents that a cell proper 101 will be in a busy condition by hot environments. That is, Cells 100a and 100b become the thing equipped with the safeguard which the PTC component 110 built in.

[0051] Moreover, the internal pressure which the amount of foil-like Itabe fractured the relief valve 20, and carried out the abnormality rise when the pressure of the gas which occurred although there was a possibility that a cell proper 101 might result in a burst if Cells 100a and 100b go up even to abnormal temperature and gas occurs in a cell proper 101 reached the working pressure in the relief valve 20 is emitted outside. Since the emission opening 20a top of a relief valve 20 is closed by the resin sheet 40 and it is further covered with the resin mold object 103, the gas which blew off from emission opening 20a is emitted outside from the interface of the resin sheet 40 and the resin mold object 103, and a cell proper 101. Therefore, it is prevented that a cell proper 101 results in a burst by the temperature rise, and it can be constituted on the cells 100a and 100b by which the safeguard of a duplex was prepared with said PTC component 110. [0052] The cells 100a and 100b constituted by the above like can aim at improvement in an appearance and reinforcement by preparing sheathing covering further. As shown in drawing 6 (b), sheathing covering can be based on the secondary mold object 120 which forms opening on the positive-electrode external connection terminal 104 and the negative-electrode external connection terminal 105, covers a terminal assembly 102 top, and covers the side peripheral surface of the resin mold object 103, and the winding sheet 121 wound around the side peripheral surface of a cell proper 101, and the cells 100c and 100d of an appearance as shown in drawing 7 can be made to it. Polypropylene resin, polyethylene terephthalate resin, polycarbonate resin, the resin containing these, etc. are used, and the winding sheet 121 is giving an adhesive layer to this resin, and is stuck on Cells 100a and 100b. Moreover, the effectiveness which raises the function as a cell is done so by using for the aforementioned winding sheet 121 the film which has a desired function. For example, it replaces with the aforementioned resin and the effectiveness of raising the reinforcement of a cell is acquired by using the fiber strengthening mold film which distributed the glass fiber etc. Moreover, an EMI (electromagnetic interference) shielding layer can also be given to the winding sheet 121 by distributing nickel powder and carbonyl iron powder by high concentration in an acrylic pro polymer. In addition to the electromagnetic interference to the electronic parts mounted in a terminal assembly 102, the winding sheet 121 in which this shielding layer was formed does so the effectiveness which controls the electromagnetic interference to the device by which it is equipped with this cell. Moreover, color, a pattern, etc. can also be ornamented at the winding sheet 121. When a cell is especially applied to the device which has the configuration exposed outside, the winding sheet 121 according to the color by the side of a device and a color tone is used.

[0053] Subsequently, the cell pack concerning the 2nd operation gestalt is explained. This operation gestalt shows the example which constituted the cell pack applied to a portable telephone using the rechargeable lithium-ion battery of a flat square shape. It is required that the cell pack applied to a portable telephone should be equipped with the safeguard which protects a rechargeable battery from the mechanical strength which can bear the impact by the fall which is not avoided as the high energy consistency corresponding to advanced features and a pocket device in addition to small, a light weight, and a thin shape, the structure which is hard to be decomposed, a short circuit and overcharge, an elevated temperature, etc., and the cell pack shown below is constituted so that these requirements may be filled.

[0054] The appearance of the cell pack 1 concerning an operation gestalt is shown, and drawing 8 carries out external exposure of the external connection terminal 6 which becomes an end face from a positive-electrode terminal and a negative-electrode terminal, and a temperature detection terminal on the other hand, it sticks the submersion seal 9 on the test terminal 30 mentioned later, and is constituted by the flat unsymmetrical configuration. Drawing 9 is what disassembled this cell pack 1 and showed each component, and explains the detail and assembly procedure of the main components below.

[0055] The rechargeable battery 2 used for the cell pack 1 is the same configuration as the cell proper 101 (refer to drawing 2) applied to the cell shown in the 1st operation gestalt, and omits the explanation.

[0056] As shown in a rechargeable battery 2 at drawing 10, piece of one side connection 10a of a thermal fuse 10 is welded to a rivet 25. In the top face of a thermal fuse 10, as a broken line shows, the heat insulation sheet 16 was stuck and it has prevented that a thermal fuse 10 melts at the time of the resin restoration mentioned later. Piece of another side connection 10b of a thermal fuse 10 is arranged on the insulation sheet 21 stuck on the obturation plate 23, and is joined to the end of the negative-electrode lead plate 5 mentioned later by spot welding. Moreover, the obturation plate 23 is pasted with thermally conductive adhesives, and a thermal fuse 10 is arranged by the condition of having carried out heat

association with the rechargeable battery 2. In addition, although the thermal fuse 10 is applied here, the PTC component 110 is also applicable like the above-mentioned cells 100a and 100b.

[0057] As shown in drawing 11, the positive-electrode soldering land 32 for said external connection terminal 6 and test terminal 30 being formed in a field on the other hand, and becoming a rechargeable battery 2 side, and also the electronic parts 31 including integrated-circuit components being mounted in a direction, and connecting with a rechargeable battery 2 at both sides which the circuit board 3 which constituted the protection network which protects a rechargeable battery 2 from overcharge,

overdischarge, and an overcurrent becomes the external surface side, and the negative-electrode soldering land 33 are formed. The end of the positive-electrode lead plate (connection member) 4 is soldered to said positive-electrode soldering land 32, and the end of the negative-electrode lead plate (connection member) 5 is soldered to the negative-electrode soldering land 33. In addition, the display of a circuit pattern, a through hole, etc. which are formed in the circuit board 3 in each drawing is omitted.

[0058] Spot welding of the other end of the negative-electrode lead plate 5 is carried out [the circuit board 3 which finished this connection processing] for the other end of the positive-electrode lead plate 4 to the plate surface of the obturation plate 23 to a rechargeable battery 2, respectively on piece of another side connection 10b of said thermal fuse 10. In this connection condition, since the circuit board 3 has become in the direction which intersects perpendicularly to the plate surface of the obturation plate 23, as shown in drawing 11 (b), each lead plates 4 and 5 of a positive electrode and a negative electrode are bent, a gap is prepared between the plate surface of the circuit board 3, and the plate surface of the obturation plate 23, and it operates orthopedically in the condition of becoming [abbreviation]. Thus, the circuit board 3 is connected to a rechargeable battery 2, and the resin restoration object 7 as shown in drawing 12 (a) is formed.

[0059] Restoration shaping of the resin is carried out, the primary mold object (the 1st frame) 11 is formed in the gap between the rechargeable battery 2 of the above-mentioned resin restoration object 7, and the circuit board 3, and a rechargeable battery 2 and the circuit board 3 are united with it. Formation of the primary mold object 11 holds the resin restoration object 7 in primary mold metal mold, and as shown in drawing 13, it carries out restoration shaping of the resin between a rechargeable battery 2 and the circuit board 3.

[0060] As shown in drawing 14, moving part 41 is constituted by the energization means 45 movable at a fixed part 42 side, and, as for the female mold 36 of primary mold metal mold, the vacuum adsorption section 43 is prepared for moving part 41. If it changes into the condition of having retreated said moving part 41, the resin restoration object 7 is arranged in female mold 36 and moving part 41 is advanced, the base will be forced on the internal surface of a fixed part 42, and a rechargeable battery 2 will be positioned. On the other hand, the circuit board 3 is stuck to the wall surface of the vacuum adsorption section 43 by vacuum suction from the vacuum adsorption section 43, and is positioned.

[0061] Although the variation and the circuit board 3 of the height dimension h of a rechargeable battery 2 are changed owing to not being fixed to a fixed location, the height dimension H from the base of said rechargeable battery 2 to the external connection terminal forming face of the circuit board 3 are fixed to a fixed location by vacuum suction, and since the amount of advance changes according to the height dimension h of a rechargeable battery 2, moving part 41 the circuit board 3 in the rechargeable battery 2 and the circuit board 3 which were positioned in female mold 36, the height dimension H from the base of a rechargeable battery 2 to the external connection terminal forming face of the circuit board 3 will be in a fixed condition by change of the height dimension G of the gap between them.

[0062] The female mold 36 top which positioned a rechargeable battery 2 and the circuit board 3 as mentioned above is closed by the punch, and resin is poured into the gap between a rechargeable battery 2 and the circuit board 3. As shown in drawing 13, the poured-in resin turns also to the perimeter of each lead plates 4 and 5 of the electronic parts 31 mounted in the circuit board 3, a positive electrode, and a negative electrode, it joins to the circuit board 3, and it turns also to the undercut part of the engagement projection 26 formed on the obturation plate 23 of a rechargeable battery 2, and is joined to the obturation plate 23. The thermoplastic polyamide resin which fluidizes at the temperature of extent which does not have a bad influence on electronic parts 31, a rechargeable battery 2, or a thermal fuse 10, and is solidified by temperature fall is suitable for resin. As an example of this resin, the thermoplasticity polyamide resin sir melt 817 made from TRL is used. 190-210-degree C molding is possible for the Sir melt 817, and with 5 seconds, since solidification time amount is short, it has the description which can eliminate the thermal effect to a cell and electronic parts.

[0063] If fusing temperature touches the thermal fuse 10 set as 104 degrees C, a thermal fuse 10 is melted and makes the function of cell pack 1 the very thing suspended, since it is the temperature exceeding 200 degrees C even if the temperature of resin is comparatively low. It is suppressing that the cure sticks the heat insulation sheet 16 on a thermal fuse 10, and the heat of resin carries out heat transfer

to a thermal fuse 10.

[0064] If the resin with which it filled up is solidified, it can take out from female mold 36 as a middle finished product 8 as shown in drawing 12 (b). It can form in the cell pack 1 by giving sheathing covering to the perimeter of this middle finished product 8. Here, sheathing covering is given by attachment of secondary molding and a winding sheet. An insulator 14 is stuck on the base of a rechargeable battery 2 before carrying out secondary molding.

[0065] As shown in drawing 15, secondary molding arranges said middle finished product 8 to the secondary mold metal mold 46, and fabricates resin to the necessary part of the middle finished product 8. The crevice 50 in which the middle finished product 8 is held is formed in the female mold 47 of the secondary mold metal mold 46, three projections 51 for external connection terminals and projections 52 for test terminals by which advance energization is carried out in the inner direction are prepared in the 1 side-attachment-wall side of a crevice 50, it counters and also the projection 54 for bases by which advance energization is carried out is formed in the inner direction in the side-attachment-wall side. If the middle finished product 8 arranges and said projection 51 for external connection terminals and the projection 52 for test terminals, and the projection 54 for bases make march out in a crevice 50, the pressure welding of the projection 51 for external connection terminals carries out to three external connection terminals 6 formed on the circuit board 3, the pressure welding of the projection 52 for test terminals carries out to a test terminal 30, and it will carry out the pressure welding of the projection 54 for bases to the insulator 14 stuck on the base at the rechargeable battery 2.

[0066] The female mold 47 top of this condition is closed by the punch 48, and it is filled up with resin in the secondary mold metal mold 46 from the gate 53 established in the punch 48. As resin is injected in the secondary mold metal mold 46 from four places and it is shown in drawing 16 External exposure of the external connection terminal 6 and the test terminal 30 of the middle finished product 8 is carried out. While forming the up shaping section 17 which was made to carry out external exposure of the center section of the insulator 14, covered the primary mold object 11 and the circuit board 3, and fixed on the obturation plate 23 of a rechargeable battery 2 The lower shaping section 18 which wrapped in the perimeter of an insulator 14 on the base of a rechargeable battery 2, and fixed in predetermined thickness is formed, and the connection shaping section 19 which connects said up shaping section 17 and the lower shaping section 18 further at the side-face corner of a rechargeable battery is formed.

[0067] In primary molding and secondary molding, the class of resin chosen, respectively may be the same, or may differ. When the class of resin is the same, the degree of adhesion of resin is high and can raise the mechanical strength of a mold part. moreover, the class of resin -- **** -- a case -- each -- the resin according to the property required of a molding process can be chosen. For example, although low-temperature molding will be possible and the resin which was rich in insulation and adhesion with a metal part will be chosen if primary molding makes the key objective the pre-insulation of the circuit board 3 by resin, and the unification with a rechargeable battery 2 and the thermal effect to the circuit board 3 and a thermal fuse 10 is taken into consideration, since secondary molding serves as sheathing of a cell pack, it is rich in a mechanical strength, and the shape of high front planarity is searched for. Since the resin in a melting condition does not touch directly the configuration member (the electronic parts 31 on the circuit board 3, thermal fuse 10) of a thermal effect to which it becomes remarkable, the resin of secondary molding is applicable even if it is resin (for example, resin ingredients, such as ABS plastics) with which elevated-temperature shaping is demanded compared with the resin of primary molding.

[0068] However, when a different resin ingredient is chosen, it is necessary to take into consideration the adhesion of resin, a mechanical strength, the chemical stability of an ingredient, etc. Moreover, as for the color tone of the resin used for secondary molding, it is desirable to make it the color tone of the resin used by primary molding, comparable, or a dark color. This is for the color tone of primary molding resin penetrating and spoiling the fine sight of a cell pack, when light color resin is used for secondary molding, and it is desirable to make color of secondary molding resin into comparable or a dark color also to the color of the resist applied to the circuit board 3 and it by the same reason.

[0069] As said connection shaping section 19 is shown in drawing 17, resin is fabricated so that the one side 90-degree part of the radii side face of the rechargeable battery 2 of an ellipse may be formed in a right angle for a cross-section configuration. The secondary mold object (the 2nd frame) 12 shown in drawing 12 is formed of said up shaping section 17 and the lower shaping section 18, and the connection shaping section 19.

[0070] As shown in drawing 16, the level difference section 38 is formed in the rechargeable battery approach of the peripheral surface of said up shaping section 17, the side peripheral surface of a rechargeable battery 2 is wound by making this into an attachment positioning line, and the winding sheet 13 is wound. Then, operating state is inspected using the test terminal 30, the submersion seal 9 is stuck in the crevice of test terminal 30 perimeter at an inspection accepted product, and it is formed in the cell

pack 1 as shown in drawing 8 .

[0071] Thus, since the both-shoulders part of a field is formed in the flat radii corner where it appears in a front face for the radii of the both-sides side of a rechargeable battery 2 on the other hand and the both-shoulders part of an another side side is formed in a square shape corner of the connection shaping section 19, the formed cell pack 1 can prevent reverse loading to a device conjointly with the external connection terminal 6 be formed in an unsymmetrical location. Moreover, a radii corner corresponds to the R configuration of the corner of a device case, and the receipt of it to a device is attained, without forming useless space.

[0072] The configuration of the secondary mold object 12 in the above-mentioned configuration It forms on the circuit board 3 and the primary mold object 11 by making only the up shaping section 17 into secondary molding. Insulator 14a (cast of ABS plastics, ABS+PC resin, and PC resin) fabricated in the same configuration as the lower shaping section 18 is stuck on the base of a rechargeable battery 2, and said connection shaping section 19 is the structure which is not established. The side peripheral surface of a rechargeable battery 2, the up shaping section 17, and the edge of an insulator 14 can be covered, and the winding sheet 13 can also be wound. Since it is not necessary to carry out the mold of the whole, when fabricating the secondary mold object 12 by secondary molding, only a formation field can be put into metal mold and secondary molding can fabricate it. therefore, since it is not necessary to arrange the rechargeable battery 2 whole in metal mold, the thermal effect to a cell is made into the minimum -- the miniaturization of metal mold can both be realized and it is effective also in respect of reduction of a manufacturing cost.

[0073] Moreover, the secondary mold object 12 is beforehand formed in the same appearance configuration as the up shaping section 17 with resin shaping, this can be put on the circuit board 3, primary mold objects 11 can be covered and stuck, and the above-mentioned insulator 14a can be stuck on the base of a rechargeable battery 2, and it can also constitute so that the side peripheral surface of those edges and rechargeable batteries 2 may be covered and the winding sheet 13 may be wound.

[0074] Next, the cell pack concerning the 3rd operation gestalt is explained. This operation gestalt shows the cell pack which used two or more rechargeable batteries.

[0075] Series connection of two rechargeable battery 2a constituted by the flat square shape and the 2b is carried out, it connects with the circuit board 203, and drawing 18 unifies rechargeable battery 2a and 2b of two pieces, and circuit boards 203 with the resin mold object 202, as the appearance of the cell pack 200 concerning the 3rd operation gestalt is shown and it is shown in drawing 19 .

[0076] Although rechargeable battery 2a and 2b of fundamental structure are the same as that of the above-mentioned rechargeable battery 2, in order to ensure the unification between rechargeable battery 2a and 2b, the engagement members 26 and 26 are joined also to the base of the cell can 22. The positive-electrode connection land of the circuit board 203 and cell can 22 base of rechargeable battery 2b are connected with the positive-electrode connection lead plate 204, and the negative-electrode connection land of the circuit board 203 and piece of another side connection 10b of said thermal fuse 10 arranged on rechargeable battery 2a are connected with the negative-electrode connection lead plate 205. Moreover, it connects with the series connection lead plate 207 between the obturation plate 23 of rechargeable battery 2a, and the rivet 25 of rechargeable battery 2b.

[0077] As rechargeable battery 2a and 2b of two pieces, and circuit boards 203 by which series connection was carried out, as shown in drawing 19 , predetermined spacing is prepared between juxtaposition, it is arranged in metal mold so that it may become the reverse sense mutually, and a primary mold is made. In this process, between rechargeable battery 2a, and the upper and lower sides of 2b and juxtaposition, restoration shaping of the resin is carried out and the resin mold object 202 which unified rechargeable battery 2a and 2b of two pieces, and circuit boards 203 is formed. The engagement member 26 in which rechargeable battery 2a and 2b are prepared up and down acquires an anchor effect to the resin mold object 202, and makes rechargeable battery 2a and 2b fix the resin mold object 202. Therefore, rechargeable battery 2a, 2b, and the circuit board 203 of a condition unstable only by connecting with each connection lead plate 204,205 and the series connection lead plate 207 of a positive electrode and a negative electrode are unified strongly.

[0078] Although functioned as a cell pack also in the condition which shows in drawing 19 , it can form in the cell pack 200 shown in drawing 18 by giving sheathing covering for the improvement in the further reinforcement, and improvement in an appearance. Secondary mold and a winding sheet as well as the cell pack 1 shown with the 2nd operation gestalt can perform sheathing covering. Moreover, on the obturation plate 23 of rechargeable battery 2a, it connects with a rivet 25 like the case where it is shown in drawing 10 , a thermal fuse 10 is attached, and the resin sheet 40 is stuck on a relief valve 20.

[0079] The configuration of the cell pack which connected two or more rechargeable batteries to a serial and/or juxtaposition can constitute two rechargeable battery 2a shown in the operation gestalt of the

above 3rd, and 2b using the rechargeable battery of the number of arbitration if needed besides the gestalt which carried out series connection. For example, as shown in drawing 20, four rechargeable batteries 2a-2d can be constituted in the cell pack which carried out series connection. If the engagement member 26 is formed in the base of the cells [each second /a / 2 /-2d] obturation plate 23 and the cell can 22 also in this case and restoration shaping of the resin is carried out, two or more rechargeable batteries 2a-2d and circuit boards 203 can be unified firmly.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The perspective view showing the appearance of the cell concerning an operation gestalt.

[Drawing 2] (a) which shows the configuration of a cell proper is a top view, and (b) is a sectional view.

[Drawing 3] (a) in the condition of having attached the PTC component in the cell proper is a top view, and (b) is a sectional view.

[Drawing 4] It is the perspective view in which in (a) (b) shows the configuration of a terminal assembly an external surface side, and (c) shows a lead plate anchoring condition an inside side, respectively.

[Drawing 5] The perspective view showing the anchoring condition to the cell proper of a terminal assembly.

[Drawing 6] The sectional view showing the condition of having unified the terminal assembly and the cell proper with the resin mold object.

[Drawing 7] The perspective view of the cell in the condition of having given sheathing covering.

[Drawing 8] The perspective view showing the appearance of the cell pack concerning an operation gestalt.

[Drawing 9] The decomposition perspective view showing each component of a cell pack.

[Drawing 10] (a) which shows the condition of having attached the thermal fuse to a rechargeable battery is a top view, and (b) is a sectional view.

[Drawing 11] The perspective view showing the condition of having attached the circuit board in a rechargeable battery.

[Drawing 12] The perspective view showing the condition in each production process of a cell pack.

[Drawing 13] The sectional view showing the condition of having unified the circuit board with the resin mold object in a rechargeable battery.

[Drawing 14] The mimetic diagram showing the configuration of primary mold metal mold.

[Drawing 15] The perspective view showing the configuration of secondary mold metal mold.

[Drawing 16] The sectional view showing the condition of having formed the secondary mold object.

[Drawing 17] The sectional view explaining the formation location of the connection shaping section.

[Drawing 18] The perspective view showing the appearance of the cell pack using two or more rechargeable batteries.

[Drawing 19] The mimetic diagram explaining the unification structure of a cell pack same as the above.

[Drawing 20] The mimetic diagram explaining the unification structure of the cell pack using two or more rechargeable batteries.

[Description of Notations]

1 Cell Pack

2 Rechargeable Battery

3 Circuit Board

4 Positive-Electrode Lead Plate (Connection Member)

5 Negative-Electrode Lead Plate (Connection Member)

6 External Connection Terminal

7 Resin Restoration Object

8 Middle Finished Product

10 Thermal Fuse

11 Primary Mold Object

12 Secondary Mold Object

13 Winding Sheet

16 Heat Insulation Sheet

17 Up Shaping Section
18 Lower Shaping Section
19 Connection Shaping Section
23 Obturation Plate
26 Engagement Projection
100a, 100b, 100c, 100d Cell
101 Cell Proper
102 Terminal Assembly (Substrate)
103 Resin Mold Object
104 Positive-Electrode External Connection Terminal
105 Negative-Electrode External Connection Terminal

[Translation done.]

* NOTICES *

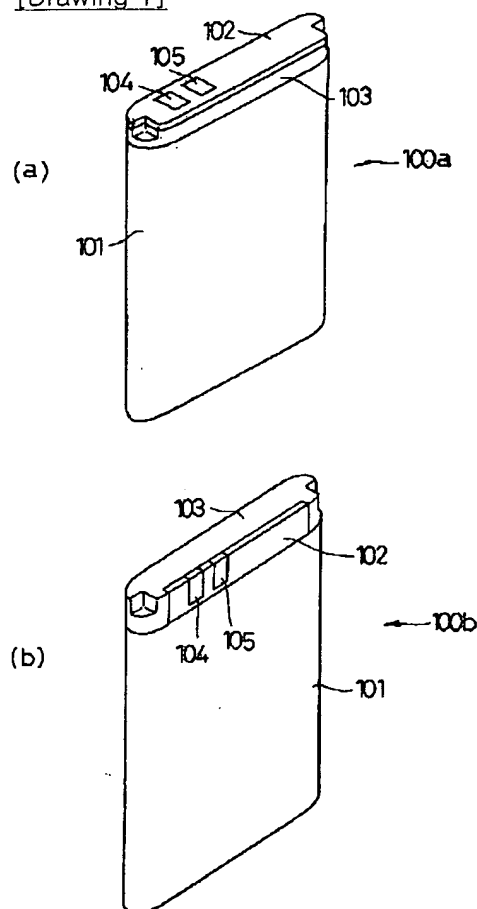
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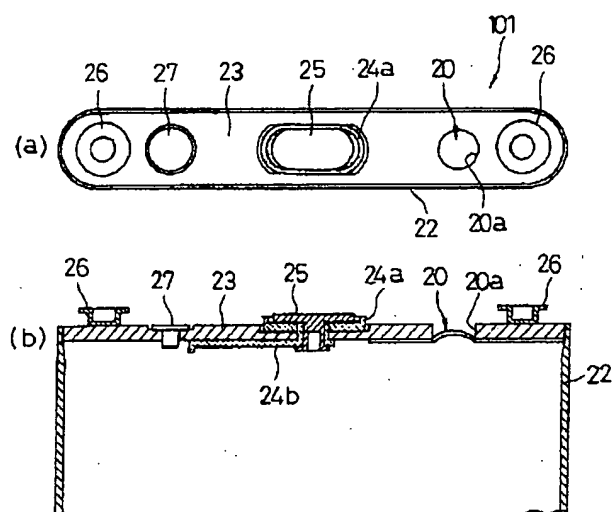
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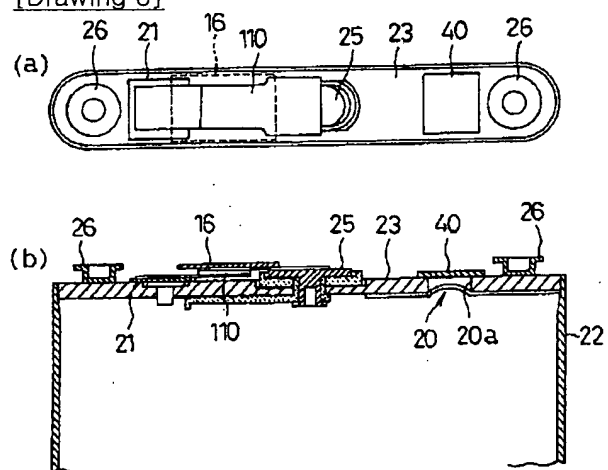
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DRAWINGS

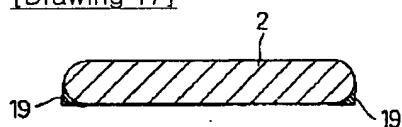
[Drawing 1][Drawing 2]



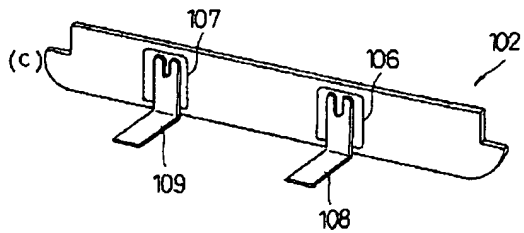
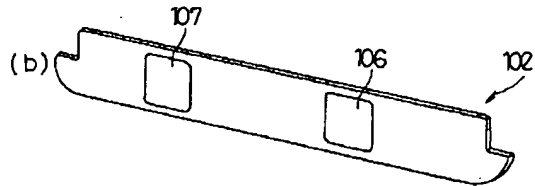
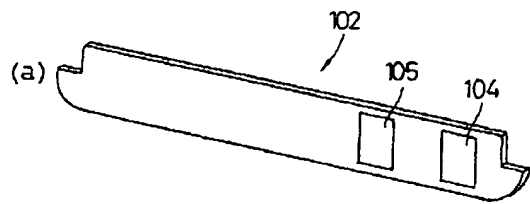
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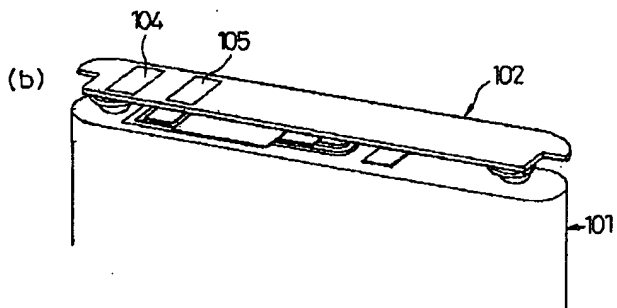
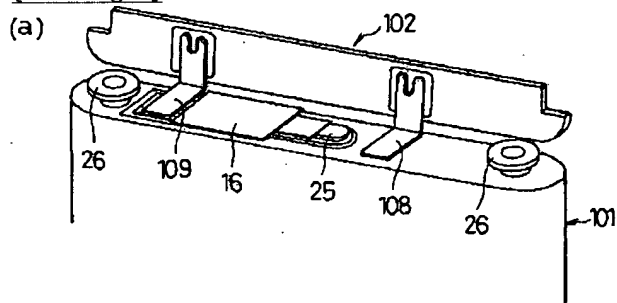
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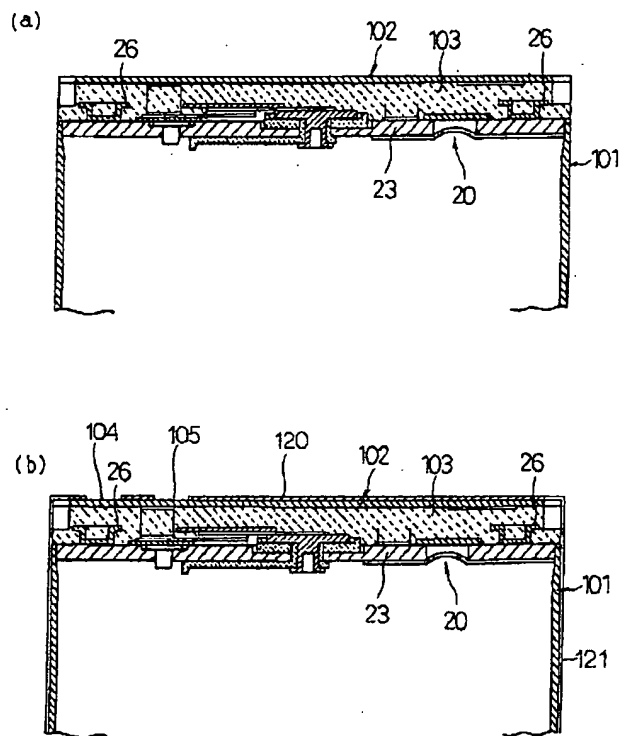
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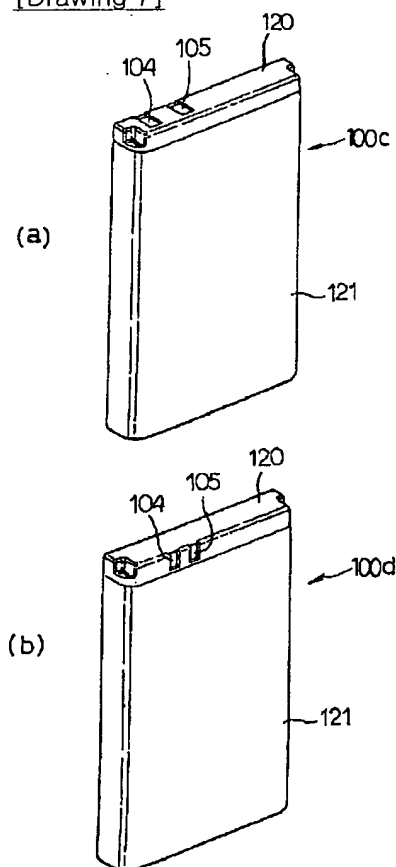
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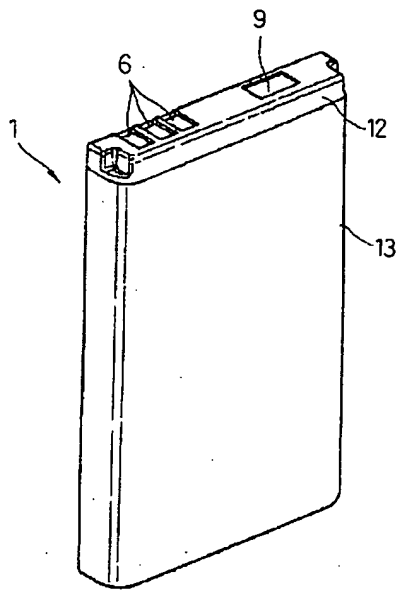
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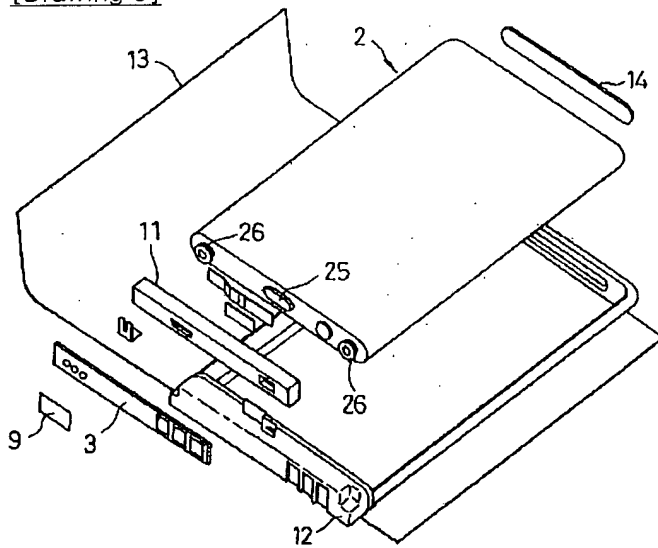
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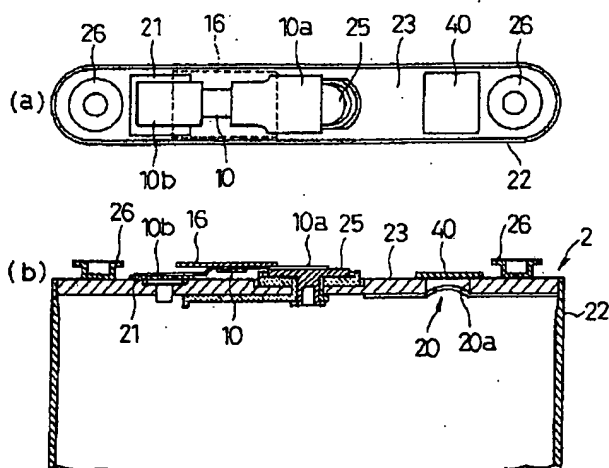
[Drawing 8]



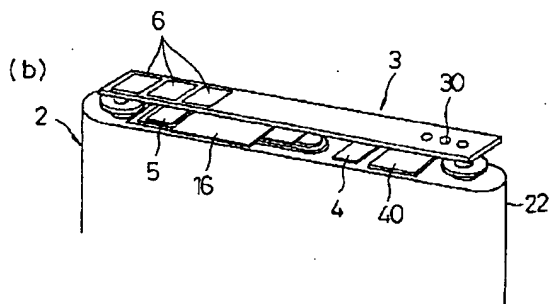
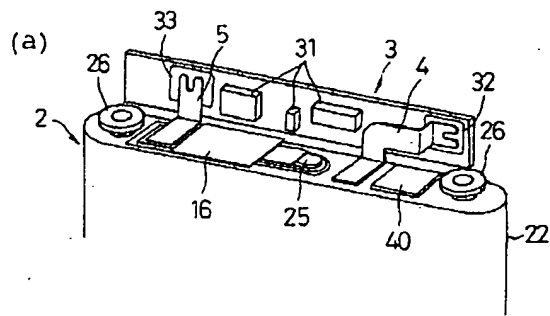
[Drawing 9]



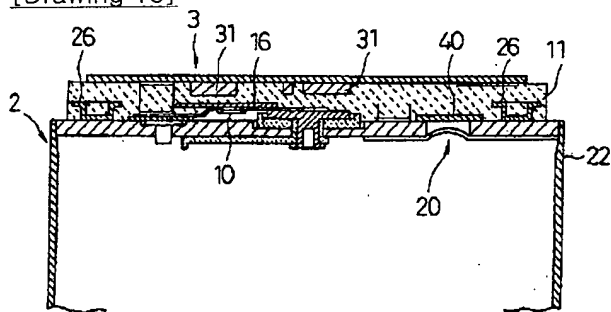
[Drawing 10]



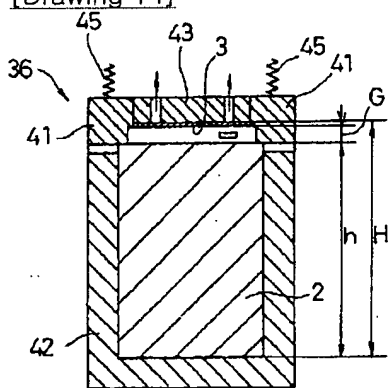
[Drawing 11]



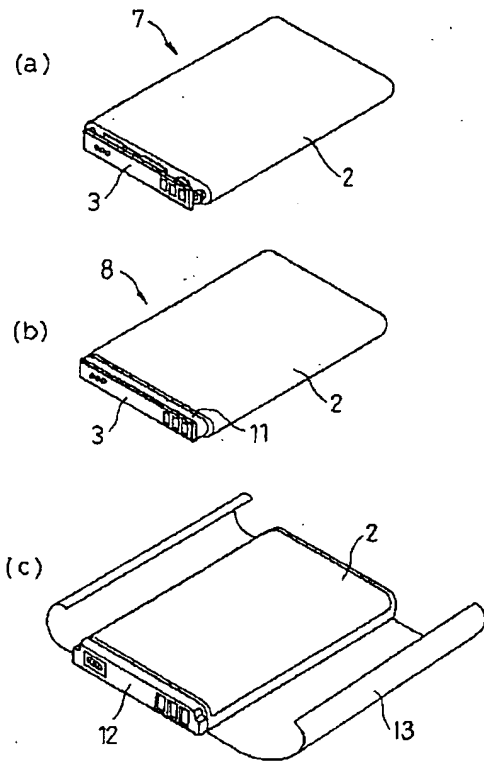
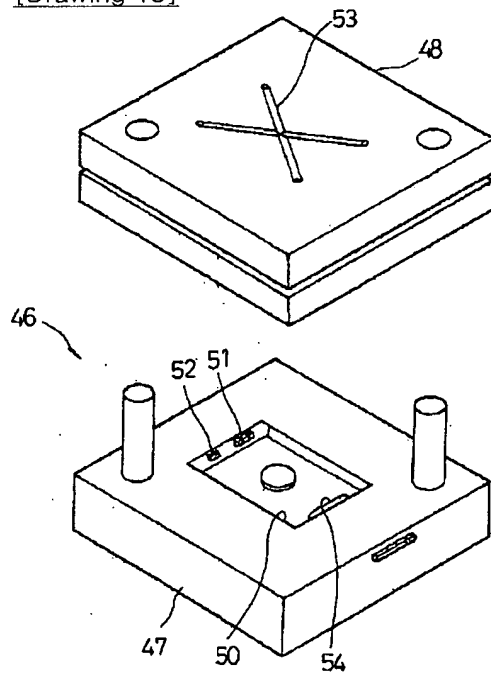
[Drawing 13]

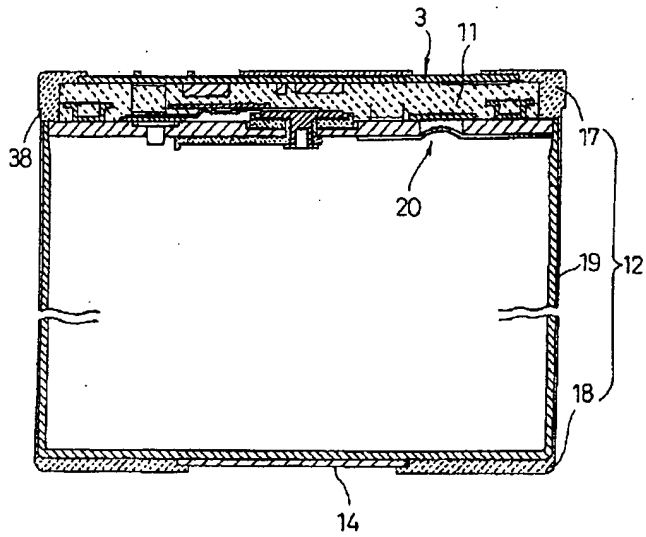


[Drawing 14]

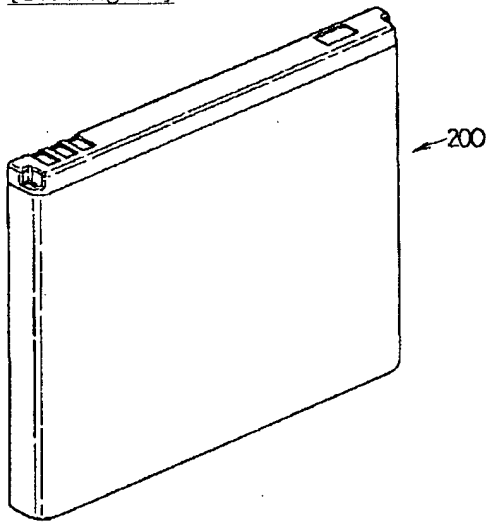


[Drawing 12]

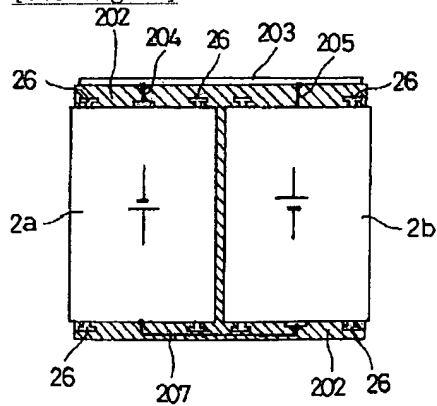
[Drawing 15][Drawing 16]



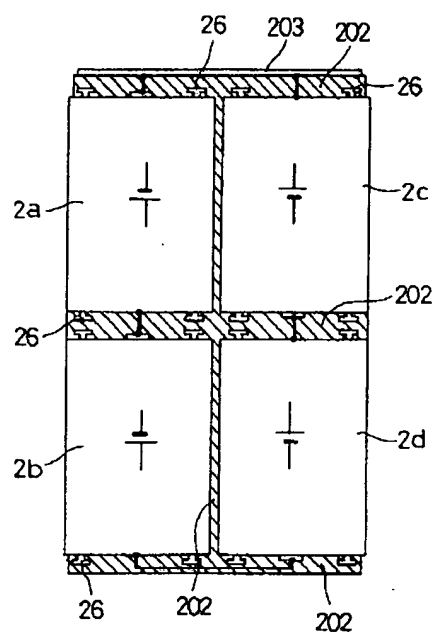
[Drawing 18]



[Drawing 19]



[Drawing 20]



[Translation done.]